Paper Industry Faces Heavy Demand

THE paper industry is staging a firm, consistent and increasing come-back.

Much to the surprise of everybody, even to many of the executives, the paper industry is awakening to the fact that it is operating in a year of the biggest demand for paper and paper products.

The awakening was signalized by what consumers, distributors and converters of paper believed was an impossible eventuality at the present moment; namely, a general advance in prices fully warranted and long overdue all along the line in all grades of paper and paper products.

There were good and sufficient reasons for the bearish belief that prices would not advance just at this time and that the best bet was that they would decline, for during the first quarter of the year, a prolonged bitter winter and an unprecedented period of adverse weather conditions climaxed by the greatest flood disaster that swept over a vast territory, had produced and forced a lessening demand, which, in turn, crystallized into a conviction by the buyers that paper was a sale and not a purchase.

Supplies in the hands of consumers were allowed to diminish; distributors liquidated their warehouse stocks; converters bought only on orders received.

The result was a drastic depletion of the supplies in face of a deferred, but increasing demand from augmented business. Up to April 1, the general flow of paper from the mills into the markets averaged about 78 per cent of capacity, which, in spite of the adverse factors noted above, showed a remarkable increase in demand for paper this year over the same period in 1935. That in itself should have been sufficient to wise-up consumers and distributors to the imminence of both a certain upturn in demand and the consequent upturn in prices.

Only a surface psychology based on superficial conviction that the temporary curtailment caused by weather and floods was basic, blinded buyers to the true facts of the situation, for within the first two weeks of April, the new orders for paper reaching the mills averaged 83 per cent of capacity and in some divisions even higher.

Then, followed in quick succession, a series of moderate price advances which caught the whole consuming and distributing public by surprise and in turn produced a demand for shipments, coverages and replenishments of stocks that has been seldom witnessed in the trade.

The net of the whole situation is just this: The mills are confronted with the greatest consumption of paper since paper became an essential commodity in this country. The paper-buying public has for years been conscious of the fact that a large overcapacity of paper production was existent. The supply was greater than the demand. What they have not recognized is the fact that this overproduction situation has been changing steadily within the past six years. The days of overbuilding of mill capacity was back in the mid-twenties. Since then, mill building has been negligible, but the population has increased, production has shifted, and the use of paper and paper products has grown tremendously.

For instance, six years ago, there was available about 1,250,000 tons of kraft paper capacity to supply a demand for 830,000 tons. Today, over 300,000 tons of machine capacity, that was formerly available for paper production, has been shifted to board products and the demand for kraft paper has increased to approximately 950,000 tons per annum. And, this shift is still continuing at the rate of about 60,000 tons per year—a nice adjustment which, as yet, is

wholly unappreciated by the rank and file of paper buyers and consumers.

And what has occurred in the sulphate division is likewise taking place in the other divisions. New processes and new products are appearing constantly.

The newsprint division in the United States is also undergoing a similar shift to other and newer products to such a degree that newsprint tonnage for general commercial use is scarce and groundwood paper products are showing price advancement for the first time in several years.

The paper industry, as indubitable statistics show, is in a healthier adjustment to market conditions than it has been since 1919-1920. In 1920, the biggest and most profitable year that the trade has on record, the mills ran 86 per cent of capacity. In April, 1936, the paper mills enjoyed a new order demand of 83 per cent of capacity and every thinking executive or employee ought to realize that there lies before the mills this year the greatest demand for paper and paper products that the industry has ever faced.

Volume tonnage, stabilized markets and better prices, assuring profitable operations are the positive facts in the present situation.

The Laboratory as a Sales Ally

A LIFETIME is regarded as too short to permit an individual to delve successfully into many of the sciences or to achieve results by dividing his efforts in different directions. This has brought us into the so-called "machine age" and has developed a high degree of specialization in almost every educational pursuit.

In a recent issue of *The Chemical Digest*, an article under the heading "When the Laboratory Sells the Product," begins: "The product of research is progress. The firm that makes use of laboratory experimentation to perfect a product is the firm whose business is most likely to improve. Competition thrives on the superiority of one product over another." The short article which deals with the worries of a technician over the progressive efforts of a competitive company, closes with this thought: "Research is a fact, not a theory. The person or firm who has vision to use laboratory research can successfully compete with seemingly superior products by making his own products leaders. Then it is easy for the sales force."

Such thoughts accent the fact that research in all its forms must be highly specialized to speed up the perfection of products and to create new ones.

We are living in an age of kaleidoscopic enlightenment. We marvel at flexible glass; we read of smokeless coal bricks; we anticipate the use of soapless soaps; we thrill to the miraculous performances of innumerable new gadgets and machines. And, too, we are constantly aware of the production of new products and the perfection of the old ones in our own industry.

The manufacturers of paper have one of the greatest fields for expansion that is open to any industry, and they will speed their own cause by giving their research staffs every possible aid in their work. We need only to review the amazing progress of the past two decades to speculate on what the future may hold through the experiments of these specialists in the field of paper research.

An Aftermath of the Depression

THE president of a firm well-known in its field of activity stated recently, in an exchange of confidences, that his business had been hit hard by the depression. He mentioned that for months after the depression got under way there had been practically nothing for his organization to do. Yet, in spite of this lack of business, confirmed optimist that he was (and is), the organization was kept intact.

It was his feeling that years had been spent in building up the organization; that those who had helped build it were entitled to everything the business could offer; and that the time would come when these specialists would be called upon again to render service to the fullest capacity of their ability.

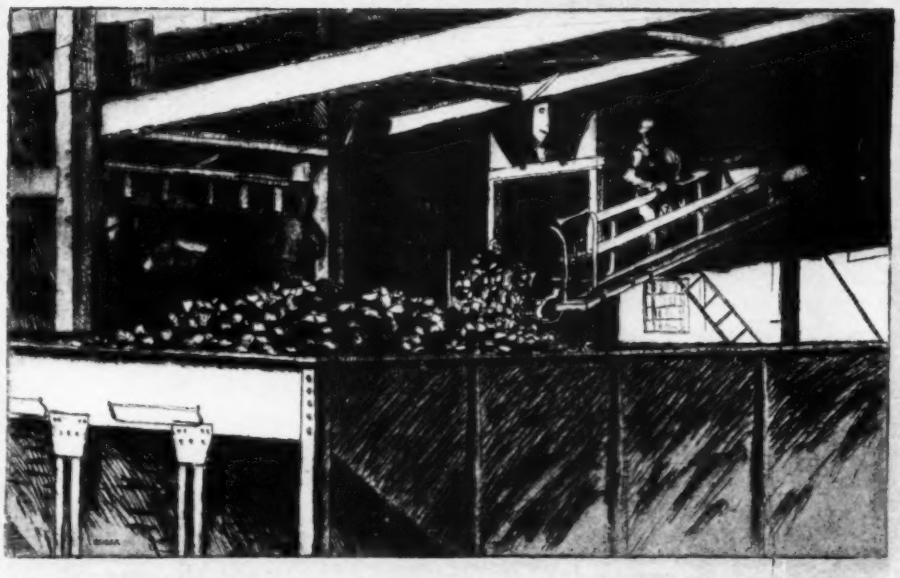
Not knowing, however, how long the economic storm might continue, it was deemed advisable to conserve the assets of the company. To this end, salaries were cut somewhat. Yet it is understood that they were kept at as high a level as, if not higher than, competition.

On this basis, the company has fought its way out of the slump. Its business is good now, and there is every indication to believe that the future is even more promising than the present.

The improvement in business from the slough of the depression, however, has developed a situation, condition, or problem, call it what you may, that is taxing the ingenuity of the head of the business to the utmost. Men, who formerly were accurate in the minutest details of their work, now are making mistakes. Somehow, these mistakes have been caught before any of them have reached serious proportions. Yet, they are mistakes that cannot continue to be made as the business forges ahead into better times without injury to the business.

The president has attempted to analyze the cause for these errors but he is yet in a quandary as to the real reason. Is it simply a question of lost proficiency brought about by the partial paralysis of business, or is it something of a more deep-seated character?

The case has been cited as it is believed that it should be of interest to pulp and paper mill executives. It is a problem in the handling of men, and, whatever the cause, it must be corrected for most efficient functioning of the organization.



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KOPPERS Coal

THE KOPPERS COAL COMPANY

GENERAL OFFICES: KOPPERS BUILDING . . . PITTSBURGH

ATLANTA CHICAGO CINCINNATI CLEVELAND DETROIT NEW YORK NORFOLK PHILADELPHIA WINSTON-SALEM

CURRENT THOUGHT

Sell Ideas . . . Not Just Paper

WILLIAM SIBLEY

IT WAS on Tuesday, I think, that I lunched with a well and favorably known advertising agency man. On the following day I took lunch with the representative of one of our largest national weeklies. The agency man said: "There were less than 200 firms in the United States last year who spent more than $100,000 on advertising. There were less than 600 firms with a 1935 advertising appropriation larger than $50,000." Knowing there to be something more than 1700 advertising agencies in the country my quickly applied mental arithmetic (of trying to divide 600 firms among 1700 agencies) left me a bit cold. Clouds of lugubrious thought shut out the sunlight of optimism.

On Wednesday, as I said, I lunched with a publication representative. He asserted: "Advertising appropriations everywhere, *right now*—are up a full 20 per cent. Not only that but this year we are witnessing the return to advertising activity of a great many firms who have done no advertising for several years. Not only that—but there are at least a hundred other firms who have indicated their desire to go into national advertising for the first time."

While the contrast in these assertions is chiefly the reflection of professional thinking (the one man with services to sell lamenting natural restrictions; the other with space to sell adding fuel to his necessary enthusiasm) yet I know there is more substance on which to base future thinking in the space man's attitude than there is in the gloomy outlook of the service man. Advertising appropriations *are* up. Almost universally. Many erstwhile dead accounts have come to life. Many firms are just now beginning to advertise for the first time. And since a large division of the paper industry is dependent upon advertising—those facts become weighty with meaning.

Because advertising appropriations now represent increased opportunity for the papermaker, let's talk about advertising for a little while. Let's consider the importance of direct mail effort in the average appropriation.

Some months ago I wrote a page ad exploiting a new catalogue. This advertisement appeared in a trade publication having 25,000 circulation. The actual publication of the ad brought 124 returned coupons requesting copies of the book. But when I took that plate, slapped it on a Gordon and pulled 25,000 reprints—then sent those reprints, with a little letter of transmittal to exactly the same list (the publication made the mailing for me) the coupon response was 865.

Practically speaking, every advertiser in every trade paper is a first-class prospect for direct-mail literature. Advertisers who go into trade publications for the purpose of getting direct inquiries or pulling mail are headed straight for the poor house. Because trade papers, generally speaking, aren't mail pullers. But trade paper advertising, when properly "merchandised" becomes one of the advertiser's best means for quick response.

Paper and printing people are wont to think of radio as being a vicious competitor for the advertising dollar. Maybe so. We won't argue the point here. But about six months ago I induced an advertiser to go into radio on one of the regional networks. This advertiser sells his merchandise through hardware stores and the plan was to exploit that product by means of a letter-writing contest. But the contest was so staged that the public had to look for the hardware store who had a window display of this product. To sell the hardware trade on tying-in with this contest (by putting in a window display of the let us say ABC kitchenware) we issued a series of large direct-mail broadsides. That series of direct-mail pieces, explaining and selling the radio contest, induced 39 per cent of all the stores in that 7-state territory to install a window display during a given week.

Naturally the contest was a paying venture. And, of course, radio took the credit. With so many window displays the advertiser couldn't help but sell a lot of merchandise. And it was a series of nine direct-mail broadsides that commanded this dealer action and assured the success of the plan.

Too many papermakers are inclined to think that the sale of such advertising material is the printer's job. It is—but only in the same sense that it is the hardware man's job to sell a stove or the druggist's job to sell a hand-lotion. For the most part, the retailers are order takers and demand suppliers. With rare exceptions, so are the printers. The hand-lotion manufacturer and the stove maker go over the heads of their retail outlets and sell the public on their products, their uses and their benefits. Right now, while advertising appropriations are up and going higher, the papermaker must go over the heads of his retail outlets and sell his particular brands to his buying public. And this year, of all years, is the time to sell what paper will do rather than "just paper." Sell ideas. . . . Or rather give away ideas, and let your product become merely the carrying vehicle for those ideas.

ADVERTISING PAGES REMOVED

THE PAPER INDUSTRY
A MONTHLY EDUCATIONAL JOURNAL

Grinding Pulp
for High Speed Paper Machines

C. O. BACHMAN, Consulting Engineer

THE production of groundwood pulp that will function properly on high speed paper machines and produce a quality sheet is one of the major problems of the newsprint industry. This problem is acute because of the numerous variables that must be dealt with to obtain the desired result. A few of the most important of these variables are: grade of paper, wood species, pulpstone, stone dressing, stone speed, pit temperature, pit consistency, effective grinding pressure area, paper machine headbox temperature, and paper machine drainage factors.

The first step in determining grinder room procedure necessary for producing acceptable pulp involves a study of the finished sheet characteristics. An analysis of this kind should include data covering strength factors, finish, and formation. Information also should be available on the multistage freeness of the stock from which the paper is to be made over a range from 400 cc. to 1000 cc., and on the speed at which the paper is to be run. The percentage of sulphite to be used in the sheet, likewise, should be noted; and tests should be made of its formation qualities and freeness.

With all of this information at hand, the analysis should proceed to include a study of drying conditions, presses, suction rolls, length and mesh of wire, table rolls, suction boxes, stock inlet, screen discharge to headbox, and headbox. It might be pointed out that an important relationship exists between temperature of stock in the headbox and sheet formation. Likewise, the rate of wire drainage is closely synchronized with multistage freeness factors.

In this latter case, for example, the close matting of the fibers on a 100-ft. wire traveling at 1100 feet per minute or 18.3 feet per second must be accomplished in less than one second, since the sheet is formed close to the slice, and while the stock consistency is still low enough to permit it. Flash-over conditions would result if drainage is too slow; or an open and wild sheet of poor quality and strength, if too fast.

The following multistage freeness readings were obtained as a result of a series of tests on a stock furnish of 15 per cent sulphite and 85 per cent groundwood, the tests being made on the same stock at the headbox and again at the first press.

cc.	*Seconds**	
	Head Box	First Press
400	9	6½
500	17	12
600	28	18
700	38	24
800	48	34
900	68	42
1000	88	54

**The higher the readings the slower the stock.*

The differential in freeness as indicated by the above tabulation is due primarily to the fact that the machine wire acts as a filter and the short fibers and fines are drained directly through its meshes. The bulk of the drainage on the wire takes place in about 6 to 8 per cent of the actual wire length in a horizontal plane.

If the stock taken from the first press were used as headbox stock again and put over the wire a second time, the drainage of the stock would be much too rapid close to the stock inlet end of the wire and a sheet having an open formation would result. This factor must be considered in the use in the furnish of broke and wire trim stock from the pit under the wire.

Another factor that must not be overlooked is stock

velocity. A spouting velocity of 1000 feet per minute is given the stock by a headbox elevation of approximately 54 inches. The stock on leaving the slice lip travels in a horizontal plane up to a point where its initial velocity is spent. During this period, formation takes place on the wire and the factor of drainage enters the set-up.

A condition is created at this time where a large amount of water must change its course of travel from a horizontal plane to a 90 deg. angle discharge. In other words, the stock and water travel in a straight line until its initial velocity is spent and at that point the water starts to drain away from the fibers in a downward direction of 90 deg. to that of wire travel.

The screen discharge into the head box, in some instances, has been taken for granted. Personal investigation, however, has revealed that a surprising differential in freeness and in consistency exists in the discharges of different screens. It would appear that the head box baffles would rectify this condition before the stock reached the stock inlet but such has not been found to always be the case.

Experiments made with a special current meter to determine the uniformity of flow through a head box showed a variation in velocity as high as 15 to 20 per cent. The velocity was slowest at the edge of the box due to surface friction. It also was found that the velocity was somewhat higher in a straight line with the screens than in a straight line with the spacing between the screens, an indication that the water apparently flows straight through under the baffles and does not dissipate its velocity sufficiently before reaching the slice. If such a condition exists in a head box set-up, it should be corrected, as eddy currents are very detrimental to uniform sheet weight and formation.

Species of Wood Used

Attention also should be given to the wood employed in the manufacture of newsprint. Spruce, balsam and poplar are the most commonly used species for this purpose. The specific gravity, pounds per cubic foot, and the average yield of groundwood fiber on a bone dry basis per cord of 100 cubic feet (solid) for each of these species approximate the following:

Wood Species	Specific Gravity	Pounds per cubic foot	Yield in pounds
Spruce	.36	27	2400
Balsam	.24	24	1910
Poplar	.36	26	2200

(These figures will vary somewhat, depending upon the geographic location in which the wood was grown.)

In analyzing the tabulation, it will be noted that there is a considerable difference in the specific gravities of balsam and spruce. The balsam fiber is more buoyant and this fact accounts for the expression often heard in paper mills that balsam stock seems to stand up on the wire—a condition found to be more pronounced where a large percentage of quick grown balsalm is used in the furnish. Balsam also has the tendency to make a sheet bulky.

Poplar and spruce have about the same specific gravity; and poplar, like spruce, if properly ground, will run well on the wet end of the machine and will give excellent results in the finished sheet. As much as 35 per cent poplar in the groundwood furnish can be used with good results in formation, opacity and finish.

Stone, Stone Dressing and Speed

To a large extent, the grade of paper being made should govern stone selection. With the present demand for high production and low costs, the trend is toward the use of the artificial stone. This stone can be operated at high temperature. At the same time, it will hold a uniform face.

Such a stone, if properly handled, will give very good results both in production and quality with a reasonable horsepower consumption per ton of pulp ground.

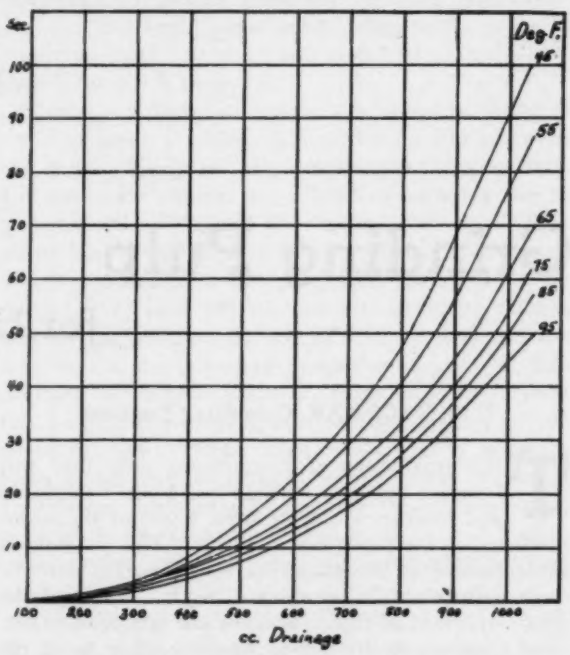

Fig. 1—Effect of temperature on stock drainage

Likewise, the dressing cycle is such that a stone of this kind will operate for days without burring, a help to the operator in maintaining uniformity of stock.

Although there is much difference of opinion on the subject of burring, because of local conditions, grade of wood, and the grit and asperity of stone, there is one factor that should not be overlooked. It is the fact that a quality sheet is formed and comprised of different lengths of fiber. The long fibers give tear value to the sheet; while medium length fibers are necessary for formation, short fibers to close up the sheet, and flour or fines as a cementing agent to bond the sheet together and to bring up its Mullen test (provided the percentage is not out of balance with the other grades of fibers). Such being the case, it has been found advisable to dress some of the stones with a different type of burr. This should not be done, however, until multistage tests have been taken of all of the producing units to determine those best suited for fiber length.

One essential factor in producing quality pulp is uniform grinder speed. The customary speed range for a 27 in. x 54 in. stone is between 3500 and 4000 surface feet per minute. Within this range, it is possible to dress a good pattern on the stone face.

Of late, there has been a tendency to experiment with higher grinder speeds. Unfortunately, insufficient data is yet available as a result of this experimentation to permit any definite conclusions to be drawn.

Pit Temperature and Consistency

Two other important factors in the production of uniform pulp are a constant grinding temperature and a constant consistency in the grinder pit.

Grinding temperature may be kept constant through the use of automatic temperature control instruments. Such instruments, which operate within very close limits, have given very good results.

The effect of temperature changes in the pit on freeness may be noted from the following test results.

Temp. Deg. Fahr.	Freeness at 700 cc.
135	34
172	32
190	28

The preceding figures show that with an increase of approximately 29 per cent in temperature there is an increase in freeness of approximately 17½ per cent.

Grinding at high temperature, if properly handled, has some advantages. The high temperature has a softening action on the resinous and bonding material of the wood and allows the fiber to be ground away closer to its natural fiber length; but increases somewhat the hazard of pitch trouble. A test of the pitch content of the pulp, however, allows the operator to establish a deadline temperature for the grade of wood being ground. Wood that has been properly aged will stand a much higher grinding temperature than green wood without developing pitch difficulties.

Very uniform results were obtained and no pitch difficulties were encountered in grinding at 185 deg. Fahr. in a series of experiments over a temperature range from 120 deg. Fahr. to 205 deg. Fahr. The stock produced at 185 deg. Fahr. ran exceptionally well on the paper machine, maintained a very constant drainage factor, and produced a high grade sheet.

The temperature at which stock is ground is closely related to the consistency of the stock. Because of this relationship, it is necessary to hold the consistency constant to obtain uniform pulp and production.

Grinding Pressure

The grinding pressure also must be uniform no matter what type of grinder is used. Any variation in pressure will show up in the freeness of the stock, and will cause temperature fluctuations which are detrimental to quality pulp.

It likewise has been found through experimentation with grinding pressures, pressures ranging from 20 pounds to 50 pounds per square inch of stone face that production and horsepower, up to a certain point, increase along similar curves. In the higher pressure range, the production curve goes beyond the horsepower consumption per ton.

Grinding at high pressure, however, has its advantages; and, if skillfully handled, a very high grade of pulp can be produced at a moderate power consumption per cord. In grinding at high pressure, the stone must be handled quite differently than at lower pressure, and the dressing must be of a finer and longer lead burr. Usually the burr is of a special lead and cut.

Head Box Temperature

In most mills, it is impractical to devise means to control the temperature of the head box stock because of the temperature variation in water supply and climatic conditions. The multistage freeness control of the stock in ratio to head box temperature gives a workable means of control at this point.

Tests to indicate the effect of temperature changes on freeness are recorded in Figure 1. The tests at the several temperatures covered by the chart were made with the same stock which in all cases at a temperature of 77 deg. Fahr. had the same freeness and the same drainage factors.

One factor that often is overlooked is the ratio of viscosity of stock to temperature. The fact that density of water changes as its temperature changes has a strong bearing on stock viscosity.

Mark's Engineering Handbook defines viscosity as the degree of fluidity of oil and states that the viscosity test consists in noting the time in seconds required for a certain quantity of oil to flow through an orifice at a standard temperature. This latter action takes place to a great degree in the drainage of paper machine stock through the wire mesh. Sight must not be lost

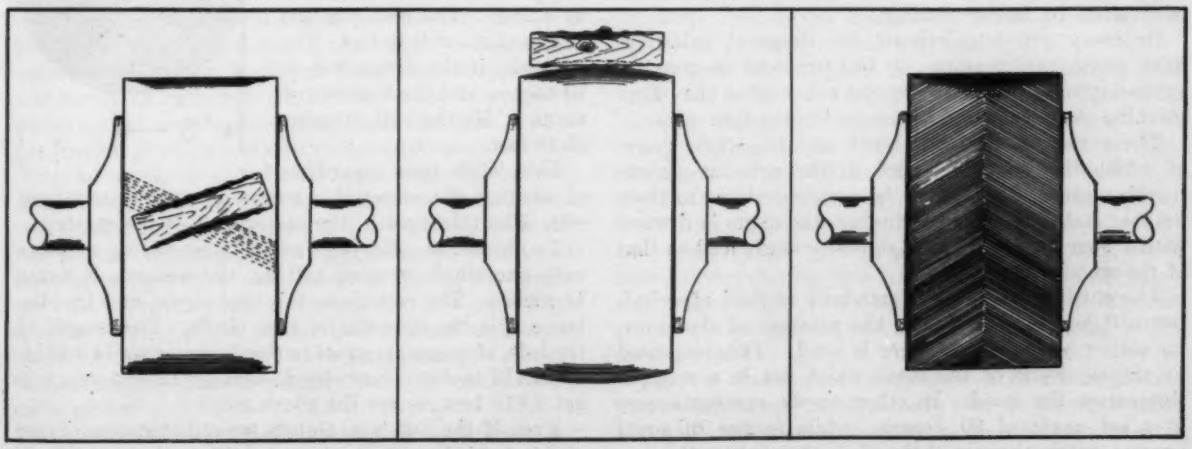

Fig. 2 (left)—Showing diagonal method of grinding wood. Fig. 3 (center)—Showing convex method of grinding wood.
Fig. 4 (right)—Herringbone type of stone dressing

of the fact that there is a time limit factor with which to contend when wire drainage is considered. This factor is governed by machine design, speed, and wire conditions, conditions which are set and not subject to hourly variations. The stock factor, therefore, being the one factor that is changeable, must be controlled to a workable degree by suitable methods. In short, as the head box temperature changes to a noticeable degree, the stock freeness should be changed to a point where a drainage balance is encountered that will produce a well-formed and uniform sheet.

Paper Machine Drainage Factors

As stated before, the drainage speed of the water through the machine wire is in direct proportion to the formation factor of the stock used and its freeness speed factor. The stock must be of such a nature that its felting qualities are in ratio to its speed of freeness drainage.

Different methods of grinding wood as a rule show different drainage speeds and felting qualities of the pulp. A thorough research of the characteristics of pulp ground, taken from each unit, will give the operator a method of determining the grades of pulp produced. In turn, it will enable him to classify the pulps as to their formation and drainage factors; and will be of assistance in establishing workable value factors to be used in producing quality high speed papers.

Several methods for grinding have been developed as a result of practically ten years of experimental work to determine just what can be done in producing satisfactory pulp from various grades of wood.

One method, known as the Bachman diagonal method, is illustrated in Figure 2. In this method the wood is placed at an angle to the axis of the stone, the angle being approximately 15 degrees for news pulp and 24 degrees for catalogue grades and tissue pulps since the greater the angle, the slower the pulp as determined through tests run with adjustable pockets.

The sliver count in pulp produced by this diagonal method of grinding is reduced very materially over that of pulp produced by grinding in the usual way. Ordinary grinding might be likened to planing wood across the grain; while this method is like planing at an angle to the grain. Planing across the grain makes a slivery cut; but a smooth surface, free from slivers, is obtained by angle planing.

Ordinary grinders, rebuilt for diagonal grinding, have given good results. A 100 per cent diagonally-ground groundwood sheet by test ran well on the paper machine as well as on a high speed newspaper press.

The curve of the stone itself and the angle curve at which the wood is placed in the grinder pockets together cause the fibers to be removed closer to their natural state. For such grinding, the stone is dressed with a burr having a direct opposite angle lead to that of the wood.

The cutting lines in the standard method of grinding will be found to follow the rotation of the stone, no matter what lead of burr is used. This is caused by the asperities of the stone which cut in a straight line across the wood. In other words, cutting occurs at a set angle of 90 degrees, while in the diagonal process, cutting occurs at the angle the pocket or magazine is set.

A second method of grinding utilizes a stone having a convex surface as illustrated in Figure 3. This type of stone penetrates the wood surface at an angle to the face of the wood and thereby cuts down the sliver count.

A third method of grinding that has been found to have some advantages in making certain grades of pulp uses a stone dressed with a herringbone pattern (Figure 4). Such a pattern can be incorporated in a stone face without much effort with proper lathe equipment. Suitable lathe equipment also is essential to dressing the stone with a convex face.

Ordinary uncooked sulphite chips, when passed through a specially designed refining and grinding unit, have been found to produce a fiber so different from the usual groundwood that additional research in this direction is contemplated. With incomplete data available, it appears that this procedure has considerable merit in pulping woods with a high pitch and resin content. Stock made in this way resembled sulphite in appearance; was long and silky; and was free from slivers.

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Quick Way to Find Length of Material in Any Roll

W. F. SCHAPHORST, M. E.

PAPER manufacturers use considerable material that comes in "rolls"—hose, belting, cables, wire, rope, chains, wire cloth, etc.—and the question often arises, "How much material remains in that roll?" Or, "Does the original roll contain full length?"

There are numerous formulas for computing lengths in rolls but I find that all of them are more or less complicated.

Here is a simple rule of my own derivation which I contend is the simplest possible: Make the one measurement "S", as shown in the sketch herewith, in inches. Then count the number of turns. Multiply the two together and then multiply that by 0.2618. The result is the length of the roll in feet. For example, if the distance S is 10 inches, and the number of turns is 10, the roll contains 26.18 feet.

This holds true regardless of whether the material is paper, leather, or anything else. The thickness of the material does not matter.

To check the rule, take an instance where we have only one single turn of belting, the distance S being 10 inches. The roll, then, is a true circle, and the distance S is the diameter of that circle. The length of the belt, of course, is equal to the diameter times 3.1416, or 31.416 inches. Now divide that by 12 and you will get 2.618 feet, as per the above rule.

Even if the roll is so tightly wound that there is no visible hole through it, the rule still holds true. And, ditto, if it is loosely wound.

Radio in Fire Suppression

The McKenzie River fire sweeping across a ridge

L. R. OLSON

IN THE never ceasing battle against the red enemy, forest fire, communication is vital to prompt and efficient action. For years one of the weak spots in handling large fires has been the inability of the fire chief to secure prompt and accurate reports on the progress of his fire so as properly to direct the work of his men. Control of the organization was at best loose, where fire crews were spread over miles of fire line in rugged backwoods country, transportation was by foot, and messenger service was usually the only means of communication. Men on large fires away from telephone communication, as most of them are, usually have been cut off from frequent contact with the fire chief.

To remedy this unsatisfactory situation, the U. S. Forest Service several years ago began to search the market for low cost, highly portable voice transmitting and receiving radio equipment that would be rugged in construction, simple to operate and otherwise suitable for fire suppression work in rough backwoods country. Nothing could be found that even remotely approximated their needs so they were forced to develop their own equipment. As a result of their efforts, seven different types of high and ultra-high frequency radio sets have been produced, each designed to meet a specific need in fire protection and suppression work. These sets are extremely low powered, all but one are battery operated, and even under dense forest canopy in mountainous regions have a reliable working range of ten miles or more.

The transmitter sections are crystal controlled and require no tuning by the operator. The sets are ruggedly constructed to stand the rough treatment inevitable in truck and pack-horse transportation. Furthermore, these can be operated by anyone after only a few minutes instruction. A brief description of the sets most commonly used in fire suppression in the Northwest follows:

Types of Sets Most Commonly Used in the Northwest

Type M Radiophone—A voice and code transmitter receiver, weighing about 150 pounds. The transmitter receiver and loud speaker are all built in one unit. The rated working range of this set is about 50 miles. It operates on ordinary commercial alternating current, but usually on fires it is operated by a self-excited, self-regulated a.-c. generator driven by a light gas engine. On large fires in the Northwest, the M set is the hub of the radio communication system.

Type PF Radiophone transmits and receives both voice and code, and complete with antenna, light duty batteries and container, weighs only 15 pounds. The rated working range is 10 miles on voice and 20 miles when code is used. More *PF* sets are used in the Forest Service than any other type. Because of their portability and rugged construction they are particularly adaptable for use by foot scouts and at stations established along the fire line. In fire camps and for other uses where weight is not a factor, heavy duty batteries are used to operate the sets, increasing their total weight to 55 pounds.

Type A Radiophone is an ultra-high frequency set that transmits and receives voice only, and weighs about 30 pounds. The rated working range is between twenty-five and fifty miles over optical paths. This set was especially developed for use in airplanes on scouting

work. The radio can be installed ready for operation on any type airplane in about ten minutes. Further, it is not necessary that the ignition system on the plane be shielded for effective operation of this set, although on an unshielded ship the working range is reduced.

Typical Examples Illustrate Methods Used

Excellent results have been secured from the use of radio on fire protection in the last four years. A typical example of its use might be as follows: A lookout discovers a fire and reports it to the fire dispatcher. The fire dispatcher sends the most available smoke chaser, or possibly a small crew to the fire. At the same time he advises the nearest radio-equipped lookout that a fire crew has been dispatched to the fire and instructs the lookout to listen in on his *PF* radiophone until the

A PF radio set in operation
(Photo by U. S. Forest Service)

fire crew reports by radio. When the crew reaches the fire, they attempt to corral it and if this is impossible, set up their *PF* radiophone, call their designated lookout, who has both telephone and radio set, and ask for reinforcements. The lookout immediately relays the information to the fire dispatcher by telephone. Should the fire develop into considerable size, radio communication is established from the fire direct to the dispatcher headquarters and additional radio sets are located at strategic points around the fire to communicate with the headquarters camp. In a number of instances on both large and small fires, all communication has been handled by radio.

In 1935 for the first time in the history of the Forest Service in the Northwest, if not in the entire country, a striking demonstration was afforded of the effectiveness of prompt radio communication combined with an adequate scouting organization on a large fire.

At noon on September 4, 1935, a thin column of smoke was sighted in an old burn north of the McKenzie River on the Willamette National Forest. Within an hour this smoke column had developed into a crown fire, sweeping up the mountain side to the summit to the north. By nightfall the fire had covered nearly 2000 acres of the most rugged topography in the Cascade Mountains of Oregon. The Forest Supervisor, acting as fire chief, assembled CCC and other crews at the fire as rapidly as possible. Equipment and additional overhead were assembled from the forest stores and from the Regional Office. By the following morning 1450 men were working on all sides of the fire.

A regional scouting unit which had been organized, trained, and equipped for such service, was dispatched to the fire. It was completely supplied with portable radio equipment for establishing communication on the fire front. Fifteen minutes after its arrival, the *M* set was operating and had made contact with the Forest Service radio station in Portland, over 100 miles away.

As the fire fighters lined up for breakfast the first morning, five CCC boys were chosen from among them to operate field sets. The requirements for the job were reasonable intelligence, and a good speaking voice. After a half-hour instruction on the installation and use of the sets, these operators were dispatched to the fire. Ten minutes after the arrival of the men at their respective posts, radio contact was made with the headquarters camp.

There were five *PF* sets used at various points on the fire. One was used at a side camp, two at strategic points on the fire line, and the other two by foot scouts who reported to the headquarters camp whenever they secured any important information. Schedules were established providing for half-hour contacts between the base camp and outlying phones. All communication was by voice and there were no failures. A telephone line located along the east side of the fire provided communication for two sector bosses, one side camp, and scouts in that area with the base camp.

All reports were assembled at the base camp and changing fire fronts and locations of camps and men were charted on a map so that the fire chief had up-to-the-minute information regarding the progress of the fire at all times. If there was a break in the fire line, it was reported; if a new spot fire was discovered; if a local shift in the wind direction, or any other change occurred, the facts were promptly known.

At 5:00 A. M. on the morning following the start of the fire, a scout reported a spot fire uncontrolled and the night's work of the 25-man crew assigned to corral the fire lost. The spot was at the base of a mountain slope in a very inflammable type of timber. Should the fire escape, it would threaten the whole area above, as well as a 200-man crew which was working there. The fire chief quickly changed plans and rushed 100 additional men to the spot fire. Four hours later the foreman of the crew on the spot fire reported by radio that the fire was corralled. He was then directed to leave adequate patrol and proceed with the remainder of his crew to a designated sector on the main fire.

During the second day of the fire, it was decided to locate two sub-camps on the fire near the summit of a high mountain ridge. Men working adjacent to these camps did not return to the base camp, instead they were directed to the sub-camps, and by means of radio, pack trains equipped with bedding and food were dispatched to supply them.

On the second day, two large spot fires were discovered behind a high ridge on which the main fire was burning. This information was given the fire chief by radio, and crews in the near vicinity of the threatened area were dispatched to them by the same means. Fearing additional fires might be burning undiscovered

in this inaccessible territory, an airplane trip was made over the fire to verify and supplement the information given by the ground scouts. Their data was found to be correct and this information was radioed to the fire chief direct from the plane. Through the use of radio, at least an hour of valuable time was saved in conveying the information to the fire chief where, without radio communication it would have been necessary for the air observer to return to the landing field sixty miles away, and then contact the base camp by long distance telephone.

Additional services rendered on the fire by radio included frequent fire weather forecasts secured from the Weather Bureau, supplemented by air ways weather data which enabled the fire chief to vary his attack currently as necessary to cope with changing fire weather conditions. Radio was also highly essential in the service of supplies.

These are some of the many examples of efficient action made possible by quick communication; action that could not have been possible except by the use of radio. Undoubtedly the suppression costs and the acreage burned on this fire were materially less than would otherwise have been possible without radio communication. Through the use of radio, the fire chief was enabled to direct his man-power so there was much less wasted effort on this fire than normally exists on large fires. No serious breaks occurred on the fire lines, although weather conditions were severe; in general, the most dangerous points were attacked first and threatening spot fires were promptly checked, which, had they been allowed to burn unchecked, would have nullified much of the work already done. Such organized radio and scouting service is of particular value in rugged mountain country where foot scouts not equipped with portable radio communication are hopelessly slow and where fires if they escape, sweep rapidly up the slopes.

Realizing the opportunity for some excellent fire prevention education on the McKenzie River fire, forest officials made arrangements with a large Portland broadcasting station to rebroadcast from the Forest Service radio net, a direct-from-the-fire-line description of the fire, and the steps taken to corral it. A forest officer gave three broadcasts daily from the fire line with the result that public sentiment was aroused and a valuable fire prevention lesson driven home.

While radio plays an important part in fire suppression communication as a supplement to the always necessary telephone system, its use is not limited to that purpose alone. In many instances where a telephone line would be impossible for one reason or another, or where maintenance and carrying charges on lightly used lines greatly exceed the cost and maintenance of radio, radio communication is used. Installations have been made on national forests from Maine to California, and from Puerto Rico to Alaska. To date, the Forest Service has more than 1200 of these tiny radio stations.

Although many non-federal forest protection agencies are confronted with the same communication problems as the Forest Service, their use of radio in forest protection fire suppression has been limited because of the difficulties imposed by law on the use of radio transmitters by non-federal agencies. Non-government agencies are required to secure construction permits and station licenses and the time required to obtain these permits makes it necessary to anticipate radio set requirements considerably in advance of actual need. This means that if large fires should suddenly occur, demanding the extensive use of radio, it would be hopeless to attempt to obtain licenses to operate a radio net.

There is another serious difficulty in the use of radio in that the number of avilable wave channels is extremely limited. There are only two so-called "special emergency" channels that are open to this class of use and then in most cases only when actual emergencies exist. This restriction is a serious handicap to state and private use of radio because communication in forest protection and suppression go hand in hand and limitation on the use of radio for the one purpose necessarily limits its use for the other. For example, it is not likely the Federal Communications Commission would permit use of these emergency channels to communicate with an improvement crew, a patrolman, or an emergency lookout, unless such communication concerned a fire actually in progress.

However, should the regulations regarding the use of "Special Emergency" channels be modified to permit "Special Emergency and Forest Protection" communication with radiophone on these channels, this would be a boon to the state and private forest protection agencies.

(The author is connected with the U. S. Forest Service at Portland, Oregon, as Chief of the Regional Scouting Unit which is referred to in this article.—*Editor's Note.*)

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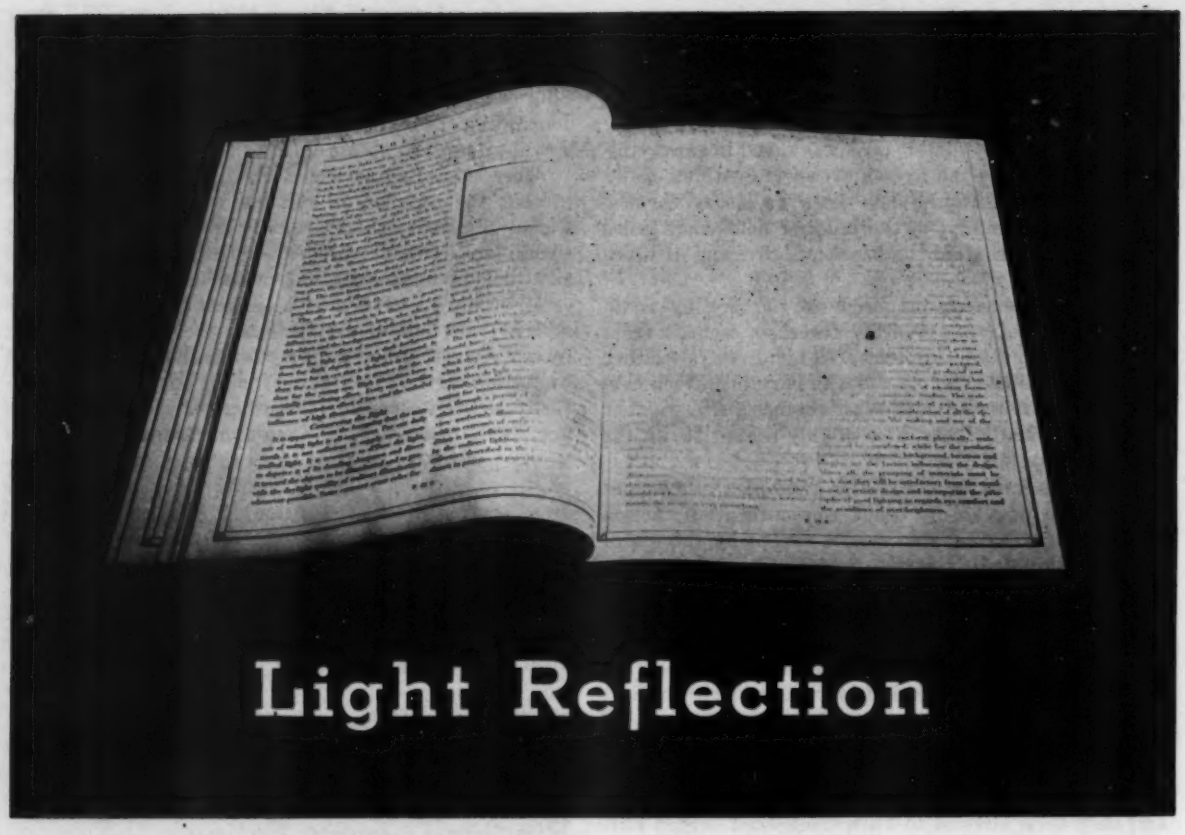
Rhythm Lessens Fatigue

WHEN soldiers are marching to the rhythm of band music, less fatigue is felt than when they are merely walking along without cadence, says Dean F. W. Shumard of the National School of Time Study, Norwalk, Conn. Laborers who sing or chant during their working movements, he continues, are not always manifesting the feeling of pleasure in their endeavors, but they are creating a rhythm for their movements which makes their work easier.

One reason for the efficacy of this rhythm in lessening fatigue is that it keeps the worker's mind away from the contemplation of his tiredness. Everyone knows from experience that a person not conscious of his growing fatigue is less tired at the end of the day than one whose introspection constantly centers on the likely effects of the work to his efficiency. Therefore, points out Dean Shumard, one of the chief aims of time study as applied to industry is to make the manual operations of each worker as regular and rhythmic as possible. Even if a slight slowing-down of a particular operation is necessary in order to secure rhythm, the day's production is increased through the steady pace that the workman maintains.

Rapidity of motion is not necessarily more energy-consuming than slowness of movement. Usually those operations which lend themselves to rapid movements are of the light type of work, and the worker can quickly set a rhythmic pace for himself, thus saving considerable fatigue. On the other hand, slow tasks are often of the heavy type wherein rhythmic movements are nearly impossible and therefore these slow tasks are much more tiring than the faster but lighter ones.



Light Reflection

WALTER W. WILDEMAN, Commercial Engineering Department
Westinghouse Lamp Company

The possibilities of utilizing light reflection characteristics as a means of inspecting paper

VISION is purely a function of light reflection. We see objects because of the light which they reflect and we determine color by the spectral composition of light. Daylight, which comprises all colors of the visible spectrum, will naturally permit us to see objects of any color. Monochromatic light, however, will enable us to see objects only of certain colors. Both the texture and color of paper will, on one way or another, affect the reflection of its incident light. Accordingly, our vision of different paper stock will vary.

Utilizing the characteristics of reflection for inspection purposes is enjoying increasing use in a number of industries. Linoleum, textiles, and metal-coated products, to name a few, are some of the articles which are now inspected by light reflection. Experience in these fields leads us to believe that the paper industry could well afford to adopt inspection practices based on the same principle. Of course, rough stock, such as wrapping paper and the like, require no elaborate inspection process. Its texture can readily be inspected at a glance under general illumination levels. However, coated stocks and the general run of papers selling around 15 cents per pound deserve the best inspection facilities available today.

The paper manufacturer is well aware of the location in production procedure where fine inspection practice is desirable, but he may not necessarily know the theory of light reflection. Therefore, it is desirable that we first delve into the mechanics of this theory.

Under most conditions, the light from a bare incandescent lamp is so distributed that it cannot be employed effectively without the use of a reflector or enclosing glassware. These accessories are used for the purpose of redirecting the light into useful angles, thus modifying its brilliance and diffusing it to produce a soft and pleasing illumination. Otherwise the light would be ineffective.

Three systems of lighting commonly employed today are the direct, indirect, and semi-indirect. In the direct method the lighting units distribute their light downward. The indirect system sends the light to the ceiling where it is reflected downward. Semi-indirect systems send the greater part of the light upward to the ceiling while the remainder of the light passes downward through the glassware.

Transparent, translucent, and opaque substances are used to screen and redirect light. Transparent sub-

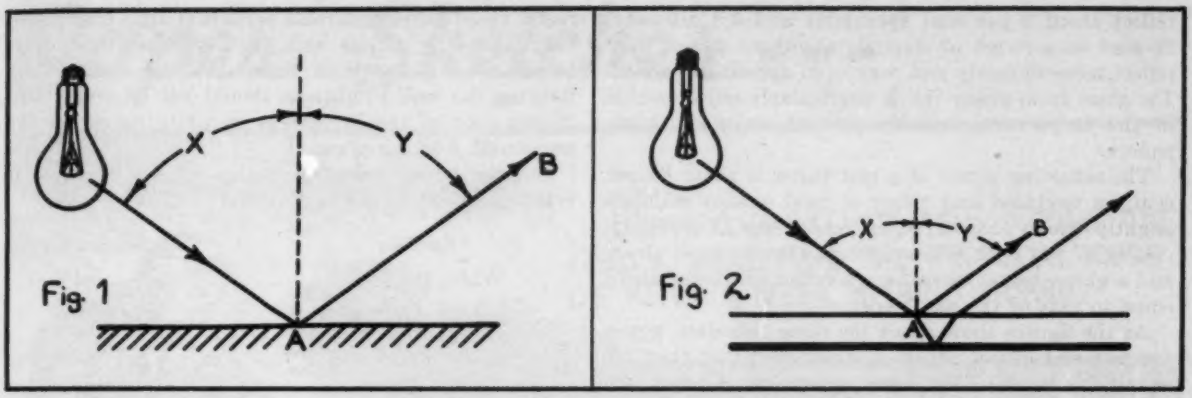


Fig. 1—Manner in which light is reflected from a surface. Fig. 2—When a surface has thickness, as in the case of a mirror, light is reflected in two parallel paths

stances allow most of the light to come through without scattering, therefore permitting objects to be clearly distinguished through them. Translucent substances allow light to come through but they scatter it so that objects cannot be clearly distinguished through them. These substances differ widely in their properties, varying from near transparency to translucency that is almost opaque. Opaque substances do not allow the passage of light and, therefore, completely obscure objects.

These substances are used in three different ways to obtain light modification, namely, reflection, transmission, and refraction.

Reflected light is that redirected by a surface, as a ball is deflected when it strikes a solid surface. Polished metal and mirrored surfaces are generally used for light reflection. Light rays striking the surface at an angle are reflected in the direction a–b (Figure 1), making the two equal angles *X* (Angle of Incidence) and *Y* (Angle of Reflection). If the surface has "thickness," such as a mirror (Figure 2), the light is reflected in two paths. This is called the Law of Reflection.

A dull surface, such as aluminum paint, reflects light in the same general manner as a polished surface but spreads the rays in a circular pattern, known as mixed reflection (Figure 3). On the other hand, a rough matte surface, such as white blotting paper (Figure 4), completely diffuses the light. In this case, the rays are reflected and re-reflected by the fibers in such a way that they are dispersed in all directions. With completely diffusing surfaces such as this, the highest intensity of reflected light is always perpendicular to the surface. Partially or completely diffuse-reflecting surfaces, such as porcelain enamel and matte surface, or paint of light tones, have a wide application in lighting practice.

Various untinted print papers differ in reflecting power. Unfilled and partially translucent stock have reflecting powers which run as low as 50 per cent. A reflection power of 60 to 70 per cent is the usual rule with medium papers just perceptibly grayish, while the finest grade of white papers reflect as high as 83 per cent. The papers of low opacity often reflect much less than 50 per cent.

Specular reflection from papers varies from practically nothing up to 5 per cent in the case of highly glazed plate papers. There is a wide variety of half gloss papers. When the surface is dulled by putting a thin mat overcoat on a glossy paper, the specular angle is small and the paper assumes a subdued brilliancy of but slight glare. On the other hand, heavily-filled stock which is calendered but unglazed, has a wavy surface that gives a bad glare because of a wider angle of specular reflection.

Print inks vary from dead mat to very glossy. The mat inks vary in reflecting power from 3 to 4 per cent. The glossy inks, if coated on a smooth hard surface,

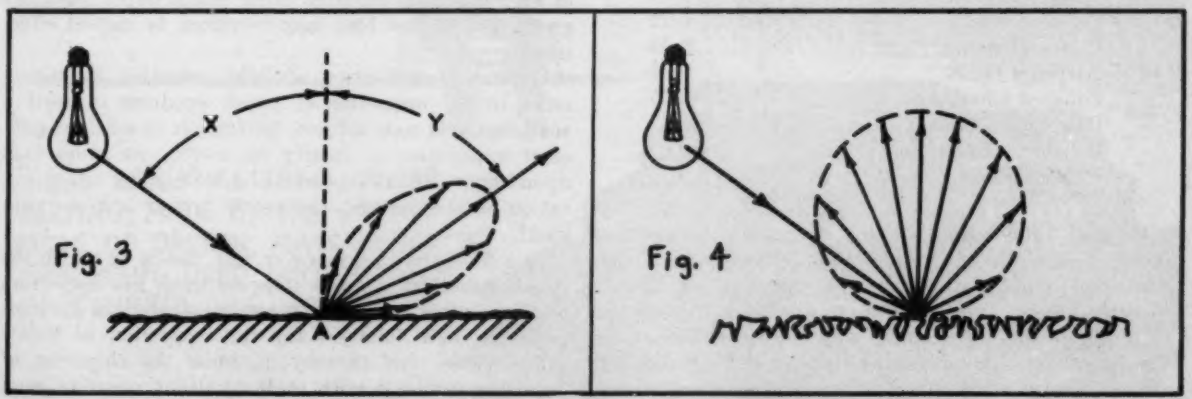


Fig. 3—From a dull surface, light is reflected in a circular pattern, known as mixed reflection. Fig. 4—A rough matte surface, such as blotting paper, completely diffuses the reflected light

reflect about 3 per cent specularly and 0.8 diffusely. If used on a rough or strongly absorbent paper, they reflect more diffusely and may even appear quite mat. The glare from glossy ink is particularly objectionable in the larger cuts, usually printed on glossy plate papers.

The reflecting power of a mat paper is about 63 per cent, an unglazed book paper of good quality which is slightly glossy has a reflecting power of approximately 57 per cent, a heavily calendered glazed paper and a glossy plate paper, have a reflection power about equal to that of the mat paper.

As the figures show about the same reflection power for mat and glossy paper, it is assumed that they are equally as good. This is not so because the mat surfaced paper has a specular reflection of only about 0.2 per cent, while the glossy surfaced paper has a specular reflection of approximately 4 per cent. As specular reflections are detrimental to accurate vision, this condition should be eliminated. Therefore, we are led to believe that print paper should possess a high reflection power and but little gloss.

However, printing is done on a large variety of paper which may be chosen for its suitability to any particular job. This would be quite satisfactory if the lighting were installed with the proper type of luminaires in order to reduce or eliminate all possibilities of glare. (See illustration at beginning of this article.) Here it is seen that a certain portion of both these pages cannot be read. The reason is very simple. The paper is of a glossy finish and the lighting is of a direct type, directing the light onto this sheet, from which it is reflected into the eyes, thus impeding vision. This is known as specular reflection which is encountered when a person looks at a glossy paper, polished metal or wood, or shiny surfaces. This can be eliminated by the proper location and type of lighting units which will produce a soft, well-diffused lighting installation.

The percentage of light reflected from any surface used is known as the "Reflection Factor." It is defined as the ratio of the flux reflected by a body to the flux incident upon it. The reflection factors for a number of typical surfaces, including those used for lighting equipment, are as follows:

Surface	*Reflection Factor*
Magnesium Carbonate	0.98
Polished Silver	0.92
White Blotting Paper	0.85
Mirrored Glass	0.86
Polished Chromium	0.65
Porcelain Enamel	0.65
Polished Aluminum	0.62
Polished Nickel	0.55

General illumination in any room is partially dependent upon the amount of light reflected from the walls and ceilings, which therefore must be considered in light control. Tinted ceilings are efficient reflections of light and are in keeping with the development of the human eye under the brightness of the overhead sky. The eyes are protected from excessive brightness in this direction by over-hanging eyebrows and eyelids. Large expanses of wall surface which have to be directly faced for considerable periods of time may prove very annoying unless kept at a comparatively low brightness. It has been found that for comfortable lighting the wall brightness should not be more than 25 per cent of the brightness of white paper on the horizontal working plane.

Comparison of reflection factors of various colors is contained in the following table:

Surface	*Reflection Factor*
White Paint	84%
Cream Paint	68%
Light Pink Paint	66%
Ivory Paint	66%
Yellow Paint	57%
Buff Paint	51%
Flesh Paint	51%
Light Gray Paint	51%
Light Green Paint	45%
Aluminum Gray Paint	41%
Light Blue Paint	36%
Sage Green Paint	36%
Brown Paint	27%
Dark Red	13%
Dark Green	9%
Dark Blue	8%

From the reflection factors of various paper stock, the manufacturer can determine what methods of lighting will be best for inspection installation. Furthermore, he may find in the new metallic vapor illuminants which produce partial monochromatic light, a new tool for inspection of paper.

For example, the sodium vapor lamp produces nearly monochromatic yellow light while the High Intensity Mercury vapor lamp produces light of which the predominant colors are yellow, green and blue. Thus, in addition to the reflection characteristics of light, it appears feasible that paper of single colors may enjoy an added inspection safeguard. Let us say that the bulk of stock in some one mill is yellow in color. If we inspect this paper under ordinary illumination we achieve certain results, but if we inspect it under sodium vapor light, the color of that paper is intensified and consequently the vision of the inspector will be facilitated to the point where he can more readily catch any defects in texture. Likewise, under the light of high intensity mercury vapor lamps paper stocks of green, yellow and blue may be easier to inspect effectively.

Since the application of light reflection characteristics in the inspection of paper products is itself a comparatively new subject, having yet to disclose sufficient experience to justify its worth, we must look upon vapor illuminants as still a more advanced application of this nature, the use of which is a story in itself.

In a final analysis, however, any means by which the paper manufacturer can improve upon his inspection methods, other than the transmission of light through paper as now followed for the inspection of better grade stocks, and thereby minimize the shipment of defective products with their resultant negative good will, should certainly deserve a place on the calendar of new developments in the industry.

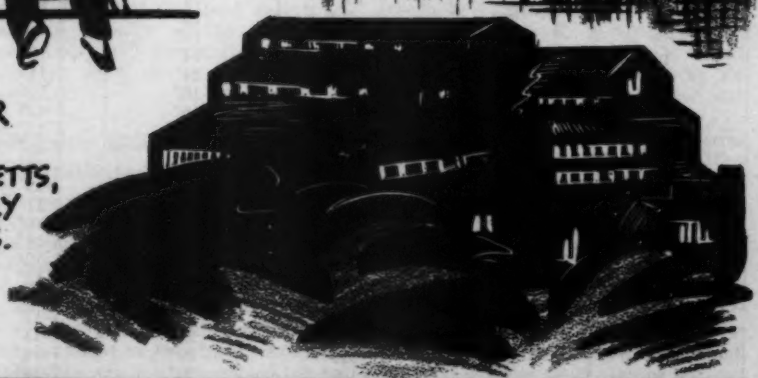
Paper Sketches ---

PENNSYLVANIA VAT MEN, DURING THE 1790'S, WERE PAID THE PRINCELY WAGE OF $3.50 A WEEK WITHOUT BOARD.

THE ENGLISH-SPEAKING COUNTRIES OF THE WORLD, REPRESENTING ONLY 11% OF THE WORLD'S POPULATION, CONSUME ANNUALLY IN EXCESS OF 5,000,000 TONS OF NEWSPRINT PAPER, OR 2/3 OF THE WORLD'S PRODUCTION. OF THE TOTAL WORLD CONSUMPTION, THE U.S. ALONE USES 44%.

FLOUR WAS USED AS AN ADHESIVE BY THE ROMANS DURING THE LATTER DAYS OF THE EMPIRE IN THE MANUFACTURE OF THEIR "BEST QUALITY" PAPYRUS.

AS EARLY AS 1868, PAPER BELTING, MADE BY THE CRANE MILLS OF DALTON, MASSACHUSETTS, WAS BEING USED SUCCESSFULLY IN SEVERAL U.S. FACTORIES.



Calender Roll Crowning

E. H. BERGES, Manager Roll Department
Farrel-Birmingham Company

THE grinding of paper calender stacks has an interesting history.

Between the years 1870 and 1885, rolls were ground and crowned in the grinder by hand operation. In some instances, the roll was set off center on one end and half the roll ground, after which the other end was ground in the same manner. The roll was then given a curve by placing a stick against the wheel head and the grinding wheel pressed against the roll with varying pressure until the curve was considered satisfactory. After years of experience, the men became expert at putting crowns on rolls. However, during this period it must be realized that the stacks were short and ran at slow speed.

About 1885 (the exact date is not known), we developed a grinder with a guide roll. This was a small roll 6 inches or 8 inches in diameter, ground straight, fastened to the side of the bed. A bar was fastened to the swing rest and contacted with the outside of the guide roll. An eccentric was placed between the bed and the inside of the guide roll. By revolving this eccentric the guide roll was sprung until it was considered the desired crown would result.

In 1893, the former or guide plate on the side of the grinder was developed. This was a long step forward but considerable hand grinding was still required, due to the fact that the former had to be made up of several curves in order to accommodate the various lengths of rolls. Hand grinding was still very important in obtaining the correct curve.

Experimenting continued until we perfected the present-day crowning device, consisting of an adjustable cam driven by gears from a rack on the bed. The cam-type crowning device produces the desired amount of crown and the correct shape based on the true deflection curve, regardless of the length of face.

There are two very important factors in grinding a roll with a crown: (1) the amount of crown and (2) the curve or shape. In many instances, the shape is overlooked, but it is just as important as the amount of crown. Often the grinder operator has not had the required time to grind and check the roll properly. As a result, it has the correct amount of crown specified but not the right shape. Consequently, when put back in the stack the machine tender has to devote a considerable amount of attention to manipulation of air on the rolls and, in extreme cases, has to use canvas pads. While the superintendent and operators are "fighting" the calender stack, a poor reel is obtained; paper has to be scrapped and production is curtailed, all of which increases the cost of operation.

Crown, theoretically, is to compensate for deflection of roll body, but actual deflection occurs over a greater center distance, from center to center of journals rather than working face. Further, the change of section from journal to roll body will affect deflection. These variables in the deflection often cause confusion in discussing crown shapes and is undoubtedly one of the reasons for the actual crown varying from the estimated crown. Also, heat develops in journals revolving in plain bearings during operation, expands the end of the face, and consequently, a few thousandths must be ground off near the end of the roll to compensate for this expansion. Sometimes, in order to obtain the relative stiffness of two rolls of varying diameter and length, we base it on the deflection formula $\left(\frac{5}{384}\frac{WL^3}{EI}\right)$, where "L" equals the length of the face. It would be well to keep in mind that the main part of this formula is to the effect that deflection is directly proportional to the cube of the length, inversely proportional to the fourth power of the diameter and directly proportional to the weight of the stack.

The necessary amount of crown for the bottom roll of a calender stack can best be obtained from the records of similar rolls which have been ground and are working satisfactorily.

Our records of crown on paper calender rolls extend over a period of forty years, covering rolls from 12 inches to 298 inches long on the face, 8 inches to 36 inches in diameter and from two to thirteen rolls in the stack. Our records cover not only machine calender stacks, but super and glassine calenders, pasting, coating and all types of hard rolls used in paper and specialty mills.

The readings for the crown are started 1½ inches in from the end of the face instead of at the extreme end. In using the Farrel Indicating Caliper we check from this point to the center of the roll. We then place the instrument on the opposite end of the roll and read from that end to the center. The reason for this is that even with the dial indicator, when the gauge goes past the center there is the possibility of the indicator being sluggish, resulting in incorrect readings.

The roll next to the bottom will give

No. of Rolls in Stack	Dia. of Bottom Roll	Face of Roll	Dia. of Next to Bottom	Dia. of Intermed. Rolls	Dia. of Top Roll	Crown on Bottom Roll
7	16″	82″	13″	4– 9″	14″	.005″
7	16″	84″	12″	3– 9″, 1–12″	14″	.005″
8	18″	99″	14″	5– 9″	14″	.007″
8	18″	107″	10″	5–10″	12″	.009″
7	20″	78″	12″	4–12″	15″	.002″
8	20″	96″	16″	5– 9″	14″	.004″
10	20″	102″	14″	7–10″	16″	.009″
10	20″	106″	14″	7–11″	16″	.010″
9	20″	112″	16″	6–10″	16″	.011″
10	22″	108″	16″	7–12″	16″	.008″
9	22″	112″	12″	6–12″	16″	.009″
10	22″	118″	16″	7–10″	16″	.010″
9	24″	118″	12″	6–12″	16″	.010″
10	24″	118″	16″	7–12″	16″	.011″
9	24″	126″	14″	6–11″	16″	.012″
10	24″	136″	16″	7–12″	14″	.015″
8	24″	142″	16″	5–11″	16″	.016″
10	26″	132″	16″	7–12″	16″	.012″
10	26″	146″	16″	7–12″	18″	.016″
10	28″	152″	18″	7–12″	18″	.016″
10	28″	156″	20″	7–12″	12″	.017″
9	30″	188″	20″	6–14″	14″	.025″
10	30″	196″	20″	7–14″	20″	.029″
10	32″	196″	20″	7–14″	20″	.022″

better results if it is crowned slightly, say from .001 inch to .003 inch, depending on its diameter and length. Care should be taken, however, not to put too much crown on this roll as in many cases where the crown has been over .005 inch end crowding has resulted, causing considerable trouble.

The top roll should have the proper crown for the pressure that is to be applied. Some types of paper require heavy pressure applied to the journals of the top roll and several thousandths crown will have to be put on the roll, whereas in other stacks no pressure is used and in such cases a crown of from .001 inch to .0015 inch is sufficient.

The crowns of a few rolls are given in the accompanying table.

From years of experience in manufacturing and servicing rolls in calender stacks and also in the manufacture of grinders, we have realized the importance of the shape or curve, especially in avoiding high spots, flat centers and the necessity of having the ends relieved to counteract expansion. To make sure that we were obtaining the correct curve we made a series of tests of the actual deflection on a large number of stacks.

The theory of the tests is very simple and self-evident. By measuring the contour of the bottom roll as the rolls were piled successively, consequent deflection of the bottom roll was determined directly. Then, knowing the shape to which the roll was ground, the condition of the top of roll would be deduced. The readings were taken every 5 per cent of the length of face with a ten-thousandth indicator, starting 1½ inches from each end.

The rolls were ground with a crown which followed very closely the line of a uniformly loaded beam, except for a short distance at the ends which are usually tapered off a few thousandths to allow for expansion of the journals. From these tests it was proven that a perfectly crowned roll will deflect until its top surface is practically a straight line in contact with the next to bottom roll. To cite one test of a 198-inch face stack, when the contact line between the next to bottom and bottom rolls was plotted it indicated a straight line to within .0001 inch. This stack was put in operation and is producing a most satisfactory reel of paper. It will be noted that we tapered off the ends of the roll. The amount of taper on the ends depends upon experience. On stacks built some years ago it will be greater than on present-day stacks as the new bearings have better lubrication and the journals operate under lower temperatures. This is also true of bottom rolls equipped with roller bearings.

When the bottom roll is reground the best results will be obtained if the entire stack is reground. This is impossible, however, in numerous cases as there are not enough spare rolls available for a complete stack. If the entire stack cannot be reground it should be the policy of every paper mill to regrind the next to bottom roll. This roll may be in very poor shape and when placed on top of a newly reground bottom roll satisfactory results will not be obtained without considerable effort.

◆ State Forestry College to Observe 25th Anniversary

The 25th anniversary of the founding of the New York State College of Forestry at Syracuse University will be celebrated this year, according to Dean Samuel N. Spring. The institution has had a remarkable growth in the past quarter century and has been a leader in keeping abreast with the rapid developments in the greatly diversified field of conservation.

The institution started in 1911 with the registration of fifty-two students. Dean William L. Bray, now head of the Graduate School at Syracuse University, had charge of the school for the first and part of the second semesters. The school at that time occupied a corner in the basement of Lyman Hall when Dr. Hugh P. Baker was brought from Penn State Forest School to take charge. He placed the college on a solid foundation and laid plans for its future development which have been largely fulfilled under his administration and that of the late Dean Franklin Moon. A large building was erected on the campus by state appropriations and occupied in 1917. Another building was constructed for housing the scientific departments and occupied in 1932.

In the meantime the college has grown from a class of fifty-two to an enrollment of nearly 500 with two modern college buildings and several separate completely equipped laboratories at Syracuse and a large school building housing fifty Ranger School students at Cranberry Lake. During these years the college has acquired approximately 20,000 acres of forest lands in various sections of the State while the teaching staff has grown from two to forty-seven, including the Ranger School. More than 3,000 students have passed the portals of the college since its establishment.

A special committee has been appointed composed of Dr. Laurie D. Cox, chairman; Prof. Edward F. McCarthy, Prof. Nelson C. Brown, Dr. Harry P. Brown, Profs. Reuben P. Prichard, Frank B. Myers and Gurth Whipple. This committee has prepared a tentative program for two dates, the first of which will be April 29 when a convocation of the student body and faculty will be held and speakers representing faculty, alumni and the university administration will participate. In the fall the annual banquet will take place two nights before the Colgate game.

The alumni are co-operating in making the celebration of the 25th anniversary a success by holding special smokers and gatherings in various sections of the country. The first and what will probably be the largest of these will be held in New York City April 24 at which former Governor Alfred E. Smith, President of the Board of Trustees; Senator J. Henry Walters and George W. Sisson, also members of the board; Chancellor Charles W. Flint, Dean Samuel N. Spring and Dr. Hugh P. Baker, now president of Massachusetts State Agricultural College, will speak.

◆ ANNOUNCEMENT is made of the passing of John B. Shepherd, sales manager and director of the Peninsular Paper Company, Ypsilanti, Mich., on Saturday, April 4, at his home in Ypsilanti.

◆ Member Mills to Meet at Institute

The principal executives of the member firms of the Institute of Paper Chemistry will gather at Appleton on June 5 and 6 to attend its first executive conference and make a thorough inspection of the Institute buildings, including the new additions, which are expected to be completed by that time. After going over the entire plant and equipment the officials will attend a series of meetings with administrators and staff members of the institution, in which its program and aims will be reviewed and discussed.

The Institute has previously held conferences of the technical representatives of member mills, but this is the first conference specifically planned for executives. The discussions are expected to be unusually fruitful for this reason, and a full attendance is expected. The conference will bring together the executives of more than fifty nationally known firms engaged in the manufacture of paper and pulp.

◆ Bag Mfrs. Institute Meets with Kraft Ass'n

A joint meeting of the Paper Bag Manufacturers Institute and representatives of the Kraft Paper Association was held at the Geenbrier April 15 to 19, inclusive. Members of the Paper Bag Institute who attended were George Stohr, Milton L. McCauley, H. C. Nichols, Joseph M. Hartman, Albert Newman, N. S. Daniels, William Mazer, A. E. Salzman, E. R. Kendler, J. L. Kavanagh, G. F. Melia, Thomas J. Burke and Joseph M. Hartman of New York, R. L. Fitts of Boston, F. M. Dickinson of Tuscaloosa, Ala., J. M. Arndt of St. Louis, John E. Alexander of Port Edwards, Wis., and E. E. Brown of Middletown, Ohio.

Attending the Kraft Paper meeting were E. R. Gay, Dernell and S. M. Hudson of New York; Harold W. Nichols and Edgar A. Hall of Cincinnati; J. A. Seibert, J. H. Cowhill, Allen C. Place, William A. Wrase, Raymond Bee and J. W. Meaker of Chicago; T. K. Davis and W. H. Anders of E. Pepperell, Mass.; S. M. Phelan, Jr. of Stamford, Conn.; Blair B. Stringfellow of Richmond; Norman S. Stone of Mosinee, Wis.; and Robert C. Duncan of St. Louis, Mo.

World Production of Newsprint Paper, 1935

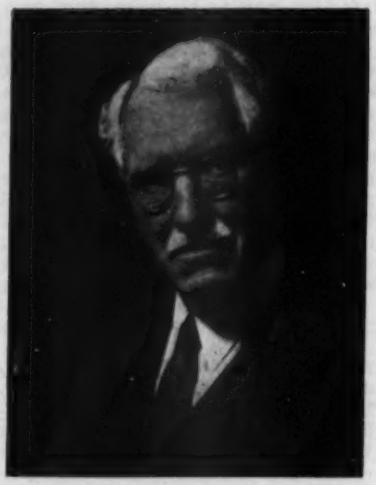
ROYAL S. KELLOGG, Secretary
News Print Service Bureau

A NEW high record of world newsprint production was established in 1935 with 7,628,000 short tons. This was 286,000 tons or approximately 4 per cent more than in 1934, which in turn was slightly greater than the previous world record of 7,319,000 tons in 1929.

Canada made 36 per cent of the world production of newsprint last year, Great Britain 13 per cent and the United States 12 per cent. Germany contributed 6 per cent, Japan and France each 5 per cent, Newfoundland, Finland and Sweden each 4 per cent, with smaller amounts from other countries.

The Canadian output of 2,753,000 tons of newsprint in 1935 was 154,000 tons more than the output in 1934 and also 24,000 tons more than the previous high record established in 1929.

The 970,000 tons of newsprint made in Great Britain in 1935 was also a new high record and 30,000 tons more than the production of newsprint in that country in 1934. For the first time Great Britain came into second place among the newsprint countries of the world, exceeding by 58,000 tons the quantity of newsprint made in the United States in 1935. The newsprint output in the United States has been decreasing heavily for several years and while there was a falling off of only 45,000 tons from 1934 to 1935, the output in the latter year was 574,000 tons under that of 1927 and still more below the peak year of 1926.



Newsprint production in Germany in 1935 was 18,000 tons more than in the previous year, but still much under 1931 and preceding years. A new high newsprint record was established in Japan with 368,000 tons of newsprint produced last year, a gain of 24,000 tons over 1934 and of 100,000 tons since 1928. Japan and France changed places in newsprint ranking last year with Japan going 10,000 tons ahead of France, whereas in 1934 France was 9,000 tons ahead of Japan. Production of newsprint in France is now nearly three times as much as in 1927.

Newfoundland also made a new record in newsprint production in 1935 with 336,000 tons, or 7,000 tons more than her closest competitor, Finland. Newsprint production in Finland has shown a consistent record of yearly increases from the 200,000 tons attained in 1927. Production of newsprint in Sweden in 1035 was 298,000 tons, a gain of 26,000 tons over the preceding year and of 23,000 tons over the previous high record in 1929. Norwegian newsprint production in 1935 was 182,000 tons or 27,000 tons more than in 1934, but still below the output in several preceding years.

Only during the past two years have authentic reports upon Russian production been available. They totaled 190,000 tons in 1934 and 193,000 tons in 1935.

There have been no large changes in newsprint production of the other smaller countries except that Italy, Spain and Poland have substantially increased since 1927, while newsprint production in Estonia and Denmark has almost disappeared.

The accompanying table, giving figures for the past nine years, is based upon reports received direct by the News Print Service Bureau, information from foreign correspondents and reports to the Department of Commerce in Washington.

WORLD PRODUCTION OF NEWSPRINT 1927-1935
(Thousand Short Tons)

Country	*1935*	*1934*	*1933*	*1932*	*1931*	*1930*	*1929*	*1928*	*1927*	*9-Year Average*
Canada	2,753	2,599	2,017	1,914	2,221	2,504	2,729	2,381	2,087	2,356
Great Britain	970	940	830	790	719	608	637	646	615	751
United States	912	957	946	1,009	1,157	1,282	1,392	1,418	1,486	1,173
Germany	464	446	412	450	540	590	623	600	565	521
Japan	368	344	304	272	258	285	286	267	246	292
France	358	353	335	275	243	240	210	136	121	252
Newfoundland	336	316	271	272	295	287	256	231	203	274
Finland	329	316	285	254	241	223	217	214	200	253
Sweden	298	272	266	257	265	240	275	234	239	261
Russia	193	190	135(?)	125(?)	100(?)	90(?)	48(?)	7(?)	10(?)	100(?)
Norway	182	155	167	200	104	202	189	198	192	177
Netherlands	92	92	87	85	79	84	77	76	77	83
Italy	76	68	72	74	69	69	52	45	42	63
Austria	50	50	50	53	62	64	62	57	50	55
Belgium	48	51	39	40	44	50	57	50	50	48
Switzerland	45	39	45(?)	45	49	47	48	40	40(?)	44
Spain	42	42	65(?)	65	62	32	30	26	25	43
Czechoslovakia	41	37	38	40	42	44	47	45	45	42
Poland	34	32	23	23	27	27	23	20	17	25
Mexico	20	20	16	13	15	14	19	17	14	16
Chile	6	6	..	..	..	..	..	..	..	1
Latvia	6	5	5	5	3	4	4	3	3	4
Estonia	4	6	6	6	17	29	27	20	21	15
Denmark	1	6	7	9	10	10	11	16	16	10
Total	7,628	7,342	6,421	6,276	6,622	7,025	7,319	6,747	6,364	6,859

Increasing Field for Centrifugal Pulp Screens

E. J. TRIMBEY

CENTRIFUGAL pulp screens with round hole perforations have been used for screening groundwood for many years. More recently they have been used for screening sulphite; and now many of the best grades of soda pulp are being screened in them. There is yet, however, a rather deep seated feeling that centrifugals will not deliver a satisfactory quality for the better grades of sulphite.

Among the newer applications for centrifugal screens is their use in board mills. For such an application the screens must be designed with generous clearances between plates and moving parts. Screens of such design can be used advantageously on old paper stock, in conjunction with continuous beaters and riffiers, for removing and defibering paper flakes with a minimum of damage to fiber lengths.

Another field in which screens of this kind can be economically used is for pre-screening ahead of flat screens, either with or without the addition of knotters.

With increased emphasis on quality, sulphite mills, which formerly used 0.008" or 0.007" slots, are going to finer cuts. This procedure naturally reduces the capacity of existing equipment and requires more screens. Frequently, the added room required for the additional screens is not available without expensive alterations or additions.

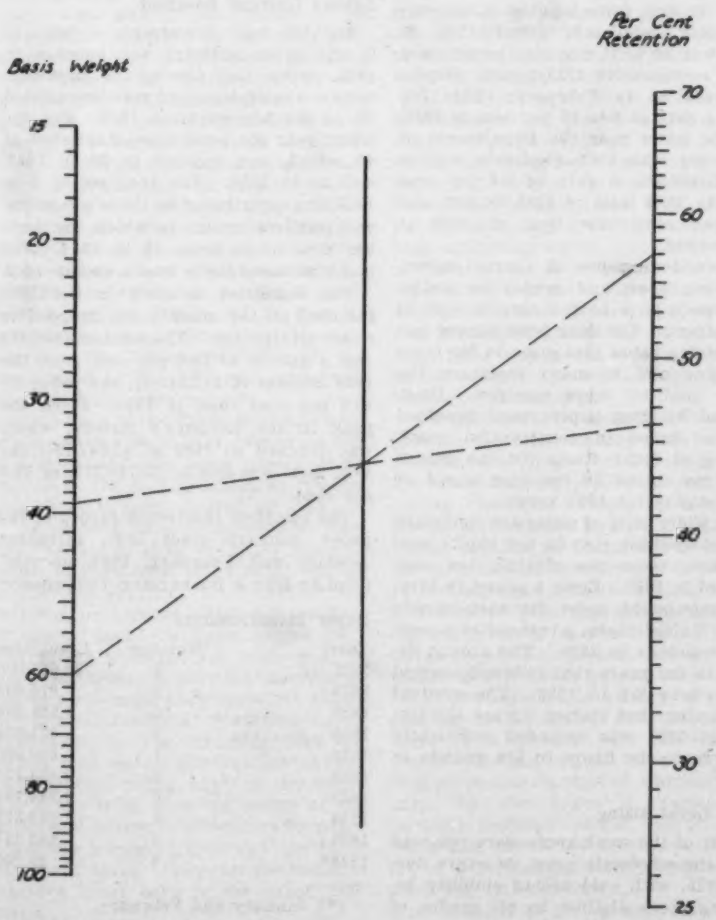
As an alternative, knotters can be used for screening out the coarser material. These machines take up relatively a small amount of space and require only a small amount of power.

All but a very small percentage of the shives in the knotter stock can be removed by passing it through centrifugal screens with moderately small sized round holes. Then, this pre-screened stock can be handled by flat screens with finer cut plates, fewer screens being required and with a marked improvement in quality of screened stock.

Some mills screen their pulp both before and after bleaching. Other mills may consider such practice desirable but do not have necessary space available for a double installation of flat screens. They also might consider the cost of an equipment installation of this kind prohibitive.

Centrifugal screens with round hole perforations, due to their high tonnage per unit, would require comparatively little floor space. Their first cost is relatively small. Therefore, it is suggested that they can be used for the entire screening operation before bleaching and that the former flat screen equipment equipped with finer cut plates could be used for the screening of the stock after bleaching.

The power requirement of the earlier designs of centrifugal screens was greater than that of flat screens. Greater efficiency in this respect, however, is obtained with more recent designs. Sulphite, for example, can be screened through 0.050" diameter round hole perforations in one of these newer designs, a design which combines both centrifugal and diaphragm action in one unit, for considerably less than one horsepower per ton; and soda pulp with similar equipment can be screened for less than 0.4 horsepower per ton.



Filler Retention Nomograph

D. S. Davis
Dale S. Davis' Associates

NEARLY every paper mill superintendent and chemist is called upon to estimate expected filler retention when changing from one basis weight to another. According to Perekalsky and Tomaschewa (Zellstoff u. Papier, 14, No. 8, 319, 1934) this situation is covered by the expression,

$$R_1 = R_2 \sqrt{\frac{W_1}{W_2}}$$

where R_1 and R_2 are percentage filler retentions at basis weights of W_1 and W_2, respectively.

The accompanying alignment chart will be found to be the most convenient means of handling computations by this equation. Its use is illustrated as follows: Fifty-seven per cent filler retention is experienced with a 60-lb. sheet. What retention may be expected upon decreasing the sheet weight to 39 pounds? Connect 60 on the basis weight scale with 57 on the percentage retention scale and note the intersection with the central axis. Connect this point with 39 on the basis weight scale and produce the line to the desired value on the retention scale, 46 per cent.

The legend over the basis weight scale does not specify the units—pounds per ream or grams per square meter—since these are immaterial as long as they are consistent.

First Quarter of Year Extends Gains of 1935

The information on this page is quoted from a survey of the paper industry recently published by DUN & BRADSTREET, INC.—*Editor's Note.*

GATHERING greater force from the strength developed during the last half of 1935, the trend of both production and distribution in the paper industry during the first quarter of the current year was definitely upward. In spite of the severe weather conditions in February and the floods in March, which damaged many mills, all branches were reported to be in a position to make a constantly better showing during the ensuing months of 1936 with respect to volume as well as earnings. The outlook for improvement in the latter has been brightened by prospects of price increases.

Even though the present schedules of mills at 10 to 20 per cent above last year's may not be maintained during the next three quarters, production doubtless will run ahead of that of 1935, which trade estimates placed at 10,375,000 tons of paper and paper board. This represented a gain of 13.5 per cent over the 1934 output of 9,140,000 tons, as compiled by the Bureau of Census. The all-time low for the industry was touched in 1932, when tonnage fell to 8,000,000, with a value of around $500,000,000, from 11,000,000 tons in 1929, valued at more than $1,000,000,000.

Profits, however, have not been in alignment with the rising sales volume, because of the increased selling and distributing costs and the mounting tax burdens made up of national, State, county, and city impositions. The general confidence in the expansion of demand, nevertheless, is evident in the plans for rehabilitation and new plant construction in the paper and pulp industry during the current year, the expenditures budgeted running almost double those of 1935, according to a survey of the paper industry.

Mill Schedules Raised

Since July, 1935, paper mills have operated each month at a higher level than in the corresponding one of the year preceding, with the outstanding increase in those producing newsprint, kraft, and paper for the building trade. Employment in the industry was up nearly 5 per cent in 1935 over that of 1934, while pay rolls from the first of 1934 to the end of 1935 advanced around 27 per cent. Schedules at most plants during the first quarter were the highest recorded for the comparative period back to 1930.

While shipments in January averaged 15 per cent more than in the year preceding, the gain was cut to 10 per cent by bad weather in February, but recovered to 20 per cent in March. Newsprint production in Canada in February established a new all-time high by rising to 221,569 tons, or 22.9 per cent more than the 1935 output of 180,305. The combined output of the United States and Canada for the first two months of 1935 totaled 601,137 tons, an increase of 12.6 per cent over the 1935 figure of 533,735 tons.

This was the largest total for any two months since 1930, when the output amounted to 632,781 tons. It followed a gain for the twelve months of 1935 of 3.3 per cent, when the two countries turned out 3,668,542 tons of newsprint, against 3,552,598 in 1934. For Canadian mills alone in 1935 output set a record at 2,753,289 tons, as compared with 2,599,244 in 1934, which surpassed the peak which had held since 1929 at 2,725,000 tons.

More Paper Used

For the first three months of the current year, wholesale distribution of paper was 10 to 15 per cent larger than in the comparative 1935 period, despite the recession in February. This followed a gain of 8 to 10 per cent in 1935. For the latter year the Department of Commerce estimated wholesale volume at $415,000,000, a gain of 8.6 per cent over the 1934 total of $382,000,000, and 24.6 per cent over that of 1933 at $333,000,000.

The widening use of coarse papers, wrapping, bags, and grades for industrial needs have been strong factors in the uptrend. The finer bond papers and advertising paper also came in for more attention, and in many instances the better qualities were specified. Roofing and building papers were benefited by the spread of construction work. Buying of fancy items for the Easter trade ran 10 to 20 per cent ahead of the comparative 1935 volume.

The wider sales of paper are confirmed by the constant rise in per capita consumption since the all-time low was reached in 1932. From 1 pound in 1810, consumption of paper for each person in the United States advanced to a peak of 220 pounds in 1929. The abrupt decline in the years that followed carried it down to 154 in 1932. The gradual broadening that started during the last half of 1933 was extended sufficiently to increase the figure to 198 pounds in 1935.

Price Level Rising

Most of the weak spots were removed from the wholesale price structure during 1935, with evidence of stability becoming more distinct in all grades of paper. As the current year opened the tendency was upward, and most of the minor reductions made during 1935 were restored. Firmness was particularly marked in the industrial papers.

On April 1 some manufacturers raised book paper prices $3 to $5 a ton and coated paper prices $5 to $11 a ton, representing an advance of 3 to 5 per cent. This announcement followed an increase of $2 a ton on bleached soda pulp, which is used widely in the manufacture of book paper. Mark-ups on other grades were scheduled on Fall orders.

The price of newsprint has been steady at $41 a ton, to which it was advanced on December 15, 1935, from $40 that had held since April, 1933, when it was lowered from $45. For three-year contracts, newsprint men have set quotations tentatively at $42.50 for 1937, at $43.50 for 1938, and at $45 a ton for 1939. In 1923 the price was $75 a ton.

Failure Uptrend Resumed

The two-year downtrend of failures in the paper industry was checked in 1935, when the number of manufacturers, wholesalers, and retailers totaled 30, or the highest since 1932. For the latter year the peak was established at 43, which was reduced to 26 in 1933, and 24 in 1934. The increase of 6 in 1935 was contributed by the wholesalers' and retailers' group, in which the number rose to 24 from 16 in 1934. For manufacturers there was a decline of 2.

The liabilities involved in the 1935 failures, on the other hand, dropped to a new all-time low. The total of $898,418 was a decline of 26.6 per cent from the 1934 amount of $1,224,807, and lower by 63.6 per cent than in 1933. From the peak in the industry's history, which was reached in 1932 at $3,647,797, the 1935 total was less by $2,749,379, or 75.4 per cent.

The complete insolvency record of the paper industry since 1927, including January and February, 1936, as compiled by DUN & BRADSTREET, INC., shows:

Paper Manufacturers

Year	Number	Liabilities
1927	5	$2,017,000
1928	5	816,900
1929	10	1,929,200
1930	3	821,226
1931	1	800,000
1932	9	2,613,450
1933	10	1,944,189
1934	8	892,529
1935	6	603,314
1936*	2	25,200

(*) January and February.

"Paper, An Historical Account"

An appreciation of R. H. Clapperton's valuable contribution to the subject

William Bond Wheelwright

MANY writers on the history of papermaking have been content to base their accounts on the statements of other authors, unsupported by exhaustive research or painstaking study, with the result that a majority of them have been traditional rather than authoritative. R. H. Clapperton, on the contrary, has not only gone to the most reliable sources and savants for his information, but has scientifically examined quantities of the earliest specimens of the most ancient papers discovered by Sir Aurel Stein now in the British Museum.

The results of his researches must oblige us to revise many of our beliefs about the earliest materials used by the inventors of paper, and correct our misconceptions about the time when cotton rags were first introduced as raw material.

Not the least astounding revelation has to do with the employment of "raw plant fibres," principally the paper mulberry, which may give us an entirely new appreciation of the probable permanence of carefully manufactured modern papers, made exclusively from purified chemical wood pulps.

Among the samples analyzed and described, is a letter dated from the year corresponding with A. D. 406. This specimen was among the thousands of documents recovered in the year 1900 in the Caves of a Thousand Buddhas, near Tun-huang, Turkestan, by Sir Aurel Stein. It is described as: "Soiled brownish buff color, short and hard in tear with a tendency to split. Bulk .008 —.009. Surface and sizing are good, and there is writing on each side of the roll. The paper was made on a laid mould with laid lines about 10 to one inch and is very strong and tough in one direction. Composition, paper mulberry."

"The discoveries of Sir Aurel Stein and Dr. Sven Hedin in Turkestan," wrote Clapperton, "show that the statements of the Chinese regarding the material used by Tsai-Lun and subsequent paper makers were correct.

"In a spur of the Great Wall Sir Aurel Stein discovered in 1911, letters on silk and wood, and also some letters on paper, A. D. 151, and according to Wiesner this paper is made entirely of rags.

"It is very interesting to note that until as late as 1885, rag paper was supposed to have been invented in Europe in the 15th century. Until 1911, it was believed, on account of the examination of papers found in Egypt, about 1885, and dating from the 9th century A. D. that the Arabs of Sarmacand invented rag paper because they could not obtain flax or mulberry bark. Sir Aurel Stein's discoveries at Tun-huang in 1900 disproves this, as an examination showed in 1904 that while more of the paper was made from pure rag, many of the books and letters were written on paper composed *partly of rags* and partly of raw plant fibres. The principal material was the inner bark of the paper mulberry.

"The records of the Chinese chronicles have therefore proved to be correct, and the Chinese were not only the inventors of rag paper, raw fibre paper, but of paper made from raw fibres and rags, and also the inventors of loading, sizing and coating of paper. In other words, they made paper for six centuries before its secret was known to anyone else, from exactly the same materials and in the same way as paper mills of Europe and the rest of the world at the present time.

"It is, of course, possible that still earlier records of Chinese paper may yet be found, for, especially in Turkestan, the climate is favorable to the preservation of all such material and frequent finds are still being made. In China itself the climate is not so favorable and it is in Turkestan that most of the discoveries of importance have been made. Apart, however, of what may be found, all evidence goes to prove that the date of the invention must be A. D. 105, the inventor Tsai-Lun, and his materials mulberry bark, old rags, fishing nets, old shoes and other waste.

"It must be said definitely that raw cotton never has been used for making paper and probably never will be. Paper has always been made from "rags," and by rags we mean fibres which have been woven, and usually linen rags. It was not till long after the 13th century that rags containing *cotton* were used.

"The earliest *dated* papers so far discovered were found at Lou-Lan by Sven Hedin. The earliest mss. are of A. D. 252, 266 and 310. Another found at the same time is supposed to date from the second century, the century when papermaking was invented."

All this evidence confirms the official Chinese dynastic records and encyclopaedias, and that Tsai-Lun "invented the art of making paper from rags . . . during the Han Dynasty in the year which corresponds to A. D. 105. . . . Public opinion in China has definitely accepted him as the inventor of paper." In further substantiation of this belief, is the find of papers in a dust bin in an old watch tower of the Great Wall of China by Sir Aurel Stein, the oldest of which is attributed to the year A. D. 151. The subsequent history of papermaking, according to Mr. Clapperton, agrees substantially with other traditional accounts, which trace its progress after the capture of Chinese prisoners by the Arabs at Sarmacand, through Baghdad, Mecca, Egypt, Morrocco and thence to Spain, where the art of papermaking became established about the 12th century.

In addition to the earliest history of paper, Mr. Clapperton follows its progress through Europe, to England, and finally into the American colonies, where it first took root in Germantown, Pennsylvania, nearly 250 years ago.

We cannot conclude our appreciation of the splendid work without some reference to its striking illustrations, which include photographs of many of the precious finds of Sir Aurel Stein, excellent illustrations of papermaking in the countries where it is described, and the ingenious insertion of paper actually watermarked in replica from a number of the most significant and celebrated pioneers of the art in England.

Printed on beautiful, laid English hand-made paper, in exquisite style and workmanship, the work of the Shakespeare Head Press, of Oxford, it is a book which can fairly be described both in authorship and make-up as monumental. The edition, published by Messrs. Blackwells, of Broad Street, Oxford, is limited to 250 copies, but few of which have yet reached the United States. One of these is to be found in the Rare Book Room of the Newberry Library, Chicago. It is greatly to be hoped that a popular edition may some day be made available.

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◆ New Name and Sales Plan for Askania

The business in automatic regulation previously carried on by H. A. Brassert & Company in the iron and steel industry and by the American Askania Corporation in other industries, has been united and placed in the hands of a newly organized company which is now known as the Askania Regulator Company. This change became effective the first week in March.

With the organization of the new Askania Regulator Company, all sales and manufacturing to all industries will be concentrated within the new organization. This change allows for sales simplification and better service to industry as a whole. The offices and the manufacturing plant of the new company remains the same as that of the old American Askania Corporation: 1603 South Michigan Avenue, Chicago, Illinois.

The new Askania Regulator Company will continue to develop and manufacture automatic controls for iron and steel mills, power plants, chemical industries, paper mills, engine and turbine manufacturers, glass works and kindred process industries. Askania control regulates pressure, rate of flow, humidity, speed of rotation, draft, water level, air for combustion and any other condition that is measurable.

◆ WM. M. SLENGER, Oak Park, Ill., who in the capacity of salesman has sold a large volume of folding cartons and corrugated and fibre containers for the old Sefton Manufacturing Corporation and later the Container Corporation of America, resigned his connection April 1. Mr. Slenger plans a vacation in California, but has announced no future plans.

American Chemical Society Meeting

Many interesting papers read before the Division of Cellulose Chemistry

AT the meeting of the American Chemical Society in Kansas City, Mo., April 13 to 17, a number of excellent papers were presented at the meetings of the Division of Cellulose Chemistry, which was presided over by G. J. Ritter, chairman. Following are abstracts of several of the papers presented at these sessions:

"The Sorption of Water Vapor by Papermaking Materials," and II. **"The Effect of Physical and Chemical Processing."** Seborg, F. A. Simmonds, and P. K. Baird.

The equilibrium moisture contents of various papermaking materials at several constant relative humidities under atmospheric pressure and constant temperature were determined. It was found: 1. Highly beaten sulphate and sulphite pulps sorb slightly, but definitely, more amounts of water than the corresponding unbeaten pulps. 2. Bleaching lowers the hygroscopicity of pulps, due, in part, to the removal of lignin. 3. Hysteresis persists throughout repeated sorption cycles and this phenomenon is characterized by a hysteresis constant holding for all samples studied and the entire range of humidities.

"The Effect of Mild Heat Treatments on Wood Carbohydrates," Elwin E. Harris.

Holocellulose and skelettsubstanz by Schmidt's method from white spruce and sugar maple wood when heated in sealed tubes at 135 deg. C. were partially converted into a lignin-like substance which responds to many of the tests for lignin. More of this lignin-like substance was formed in the early stages than in the case of Cross and Bevan cellulose which, in turn, gave more than pulp from these same woods. Since these carbohydrate fractions differ principally in their content of easily hydrolyzable material, it was concluded that the lignin-like substance was formed from the easily hydrolyzable material. Products formed from the decomposition of this easily hydrolyzable material catalyzed the decomposition of the more stable cellulose portion so that it also was converted into a lignin-like residue with continued heating.

"Bleachability Determination and Its Relation to Sulphite Cooking." Paul R. Eastwood.

In studies of the sulphite process designed to determine the influence of factors which govern yield and pulp characteristics it is important to make comparisons at the same degree of cooking.

In this paper, the bleachability test reported by John and Poppe (*Paper Trade Journal* 99, No. 9: 36-37) has been used to good advantage in determining the degree of cooking in experimental sulphite pulping studies conducted by the Kimberly-Clark Corporation, Neenah, Wisconsin.

The relationship between pulp yield and bleachability as well as a few simple relationships between bleachability and two stage bleaching are given. From these data calculations concerning the most economic bleachability to which the pulp should be cooked in the production of bleached pulps are presented.

A study is also presented concerning the effect of temperature schedule on the yield and properties of the resulting pulps.

"The Effect of Lignin on the Decomposition of Cellulose by Thermophilic Bacteria." F. R. Olson, E. B. Fred, and E. C. Sherrard.

The fermentability of a number of high grade paper pulps has been established in the following cases: filter paper, Brown's Rayon and Alpha celluloses, and Burgess sulphite. After seven days' incubation at 60 deg. C. the decomposition of a 3 per cent substrate ranged from 88 to 96 per cent. Forty-six to 77 per cent of the fermented pulp was recovered as acetic and butyric acids. Only traces of non-volatile acids and alcohols were found. The addition of H_2SO_4 lignin did not retard the fermentation of filter paper, but MeOH-HCl lignin reduced the percentage of cellulose fermented to 71. In both cases approximately 70 per cent of the substrate was recovered as volatile acids.

Fermentation of nine different ground woods (60 to 80 mesh) was attempted without success. Extraction of these woods with organic solvents and hot water did not render these materials fermentable, nor did the addition of filter paper initiate decomposition although the filter paper itself was readily destroyed. Neither acid nor alkali treatment of one of these woods (spruce) made it fermentable, but treatment with HNO_3 (0.5 to 3.0 per cent) followed by NaOH (2 per cent) did make the material available. The degree of decomposition depended on the concentration of the acid used. With 0.5 per cent HNO_3, 25 per cent of the substrate was fermented, and when the acid content was increased to 3.0 per cent 94 per cent was decomposed.

Spruce holocellulose, which contains the total carbohydrate of extractive-free wood was readily fermented.

Further work on wholly or partially delignified wood indicates that the kind of wood and the method of delignification are factors in determining the fermentability of the pulp.

These results indicate that the nonfermentability of native wood is due to its lignin content. Failure of fine grinding to improve fermentability suggests that the relationship between lignin and cellulose is not merely physical.

"The Chemical Nature of the Middle Lamella." A. J. Bailey.

A method was devised to isolate mechanically the middle lamella of wood by means of a micro-manipulator equipped with suitable microtools. The method of preparing the tools, the apparatus used, and the technic of isolating virtually pure lamella are described. Through the use of this technic enough material was isolated to permit a microanalysis. Using a microform of the Ross and Potter method of lignin analysis, the material was analyzed and found to contain approximately 71 per cent of lignin. Wood rays, springwood, and summerwood were found to contain approximately 41 per cent, 35 per cent, and 32 per cent of lignin respectively. The reliability and significance of the results are discussed as well as the agreement of the findings with earlier work.

Further Study of the Noll Method for the Determination of Lignin. By B. L. Browning and T. A. Kauppi.

Lignin in wood, wood pulps, and similar materials is usually isolated by solution of the cellulose and other polysaccharides in strong sulphuric acid, the concentration normally employed being 72 per cent by weight. The lignin is flocculated by boiling the acid solution after dilution. If the acid concentration is too low, incomplete solution of the cellulose occurs while too strong an acid decomposes the lignin and chars the cellulose which then appears in part with the lignin.

Some years ago, the proposal was made by Noll that the separation be carried out with 78 per cent sulphuric acid in the presence of dimethyl aniline, under which conditions the cellulose is very rapidly dissolved. It was claimed that the separation is rapid and that the separated lignin is quite pure.

The proposed method has a very great advantage in speed of separation and the authors have carried out further work to test its applications. The lignin is flocculated in such form that filtration is easy.

It has been found that the chief action involved in the Noll Method is due to the temperature increase which occurs when dimethyl aniline and sulphuric acid are mixed and approximately the same results are obtained if the dimethyl aniline is omitted and the equivalent temperature employed. This high temperature, however, has a considerable effect on the lignin which is changed in composition and on the cellulose which appears to be rendered partially insoluble. The lignin also retains sulphuric acid so tenaciously that not all of it can be washed out. It has been concluded that the method of separation proposed by Noll is not satisfactory despite its apparent advantages. The lignin which is separated is not sufficiently pure.

The Noll Method was found unsuitable

for analysis of pulps containing lumps or large particles as these were not dissolved in the short time of the reaction employed. Even with the usual 72 per cent sulphuric acid treatment the authors have pointed out the necessity of preparing the original material so that it will dissolve rapidly and completely.

The lignin is separated from dissolved cellulose by filtration. Since the process is sometimes very slow due to the fineness of the division of the lignin, special wide crucibles fitted with discs of filter paper have been used with complete success. By this method the liquid runs through rapidly while all of the finely divided lignin is retained on the paper.

◆ ◆

◆ Chemistry Holds Fate of Paper Industry

The race for supremacy between the states in various branches of pulp and paper production as shown by federal statistics is not only a reflection of improved market conditions, but an indication of the progress attained in forest chemistry research, states the New York State College of Forestry at Syracuse University.

In the production of paper and paperboard, New York led all other states in 1932, 1933 and 1934. In 1933 and 1934 Michigan surpassed Maine for second place but ranked third in 1932. Ohio ranks fourth; Wisconsin fifth; Pennsylvania sixth, but when it comes to the question of wood consumption in connection with this industry Washington is first, Maine second, Wisconsin third and New York a poor fourth. Consumption of wood for pulp in New York is about one-third that of Washington. Again, there is a shift in the order of leading states in the amount of pulp produced, Maine standing first, Washington second, Wisconsin third and New York fourth. New York, while a large manufacturer of the finished product, is only a moderate consumer of pulpwood. During these three years the paper and pulp industry generally has been on the upgrade, gradual recovery being shown all along the line.

The growing prominence of southern and western states in pulp production is due largely to chemical research which has made many woods available for pulp which in former years could not be employed for that purpose. While spruce still heads the list, pine and hemlock obtained from the South and West are crowding spruce closely. In fact, the combined quantity of yellow pine and hemlock exceeds the amount of sprucewood used for pulp by approximately 33⅓ per cent.

In addition to yellow pine and hemlock, there are utilized today balsam fir, poplar, Jack pine, beech, birch, maple, tamarack and a great many other kinds of trees in small quantities as well as a considerable amount of slabs and mill waste. A new development in the chemical laboratories of the foresters might change over night the situation in regard to the paper industry in this country.

Approved Pulp Testing Chemists

Following is a list of commercial and pulp and paper mill chemists that are available for weighing, sampling and testing wood pulp for moisture. These chemists have all been approved by the American Paper and Pulp Association, Association of American Wood Pulp Importers and the Technical Association of the Pulp and Paper Industry.

Commercial Chemists

Name — *Mail Address*

Andrews, A. B., Lewiston, Maine, Box 67
Broeman, F. C., F. C. Broeman & Co., Broeman Bldg., Cincinnati, Ohio
Crossley, T. Linsey, 388 University Ave., Toronto, Ontario, Canada.
Donald & Co., Ltd., J. T., 40-42 Belmont St., Montreal, Canada
Hamlin & Morrison, 216 South 2nd St., Philadelphia, Pa.
Hanks, Inc., Abbot A., 624 Sacramento St., San Francisco, Calif.
Hersey Co., Milton, 980 St. Antoine St., Montreal, Can.
Hinman, Elmer S., N. Walnut St., Spring Grove, Pa.
Johnson, Emil F., 133 Front Street, New York City
Liepsner Laboratory, F. W., 309 Camp Street, New Orleans, La.
Little, Inc., Arthur D., 30 Charles River Road, Cambridge, Mass.
Maas Chemical Laboratories, Arthur R., 308 E Eighth St., Los Angeles, Calif.
Miles, George W., 88 Broad St., Boston, Mass.
New England Laboratories, 44 Chestnut St., Springfield, Mass.
Orthmann Laboratories, Inc., 647 W. Virginia St., Milwaukee, Wis.
Perry Testing Laboratory, 201 Third Street, Detroit, Mich.
Priestley, J. G., Northwest Testing Laboratories, Hartford Bldg., Seattle, Wash.
Schwantes, Everett J., Gulick-Henderson Co., 431 S. Dearborn St., Chicago
Skinner & Sherman, Inc., 246 Stuart St., Boston, Mass.
Stillwell & Gladding, Inc., 80 West Street, New York City
Touceda, Enrique, 943 Broadway, Albany, N. Y.
U. S. Testing Co., Inc., 1415 Park Avenue, Hoboken, N. J.
Wiley & Company, Inc., Calvert & Read Streets, Baltimore, Md.
Williams, F. M., Williams Apparatus Co., 600 Trust Co. Bldg., Watertown, N. Y.
Whittington, E. F., 530 West Cedar St., Kalamazoo, Mich.

Pulp and Paper Mill Chemists

Abrams, Allen, Marathon Paper Mills Co., Rothschild, Wis.
Attwood, Fred B., 812 Scoville Ave., Oak Park, Ill. (With Container Corp. of America, Chicago)
Bradford, Harry C., Rex Paper Co., Kalamazoo, Mich.
Breitenbach, Wm. E., Grays Harbor Pulp and Paper Co., Hoquiam, Wash.
Calkin, John B., Dennison Mfg. Co., Framingham, Mass.
Cannon, Harvey P., 6209 Morton St., Germantown, Phila., Pa. (With Container Corp. of America, Manayunk, Phila.)
Connor, C. M., Glassine Paper Co., West Conshohocken, Pa.
Coster, N. W., 3705 Colby Ave., Everett, Wash. (With Soundview Pulp Co., Everett)
Fretz, Harold T., Olympic Forest Products Co., Port Angeles, Wash.
Hartnagel, Nelson, Fibreboard Prods., Inc., Port Angeles, Wash.
Hogan, J. Fenton, Carthage, N. Y.
Huntley, Robt. F., Fulton, N. Y.
Hunnemann, Jr., Arthur, Rockford Fibre Container Co., Rockford, Ill.
Kidder, W. K., Oxford Paper Co., Rumford, Maine
Koch, H. C., Auglaize Box Board Co., St. Marys, Ohio
Libby, Frank D., Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
McGregor, Geo. H., Weyerhaeuser Timber Co. (Pulp Div.), Longview, Wash.
Rammer, Hyman L., Fibreboard Prods. Inc., Stockton, Calif.
Roberts, Denis, Port Royal Pulp and Paper Co., Ltd., Fairville, N. B., Can.
Steadman, B. K., Standard Paper Mfg. Co., Richmond, Va.
Wadsworth, Dan M., Box 704, Bogalusa, La.

◆ New Officers of Society of Chemical Industry

The American Section of the Society of Chemical Industry announces the election of the following officers to serve for the year ending June 1, 1937: Chairman, James G. Vail; Vice Chairman, Wallace P. Cohoe; Hon. Secretary, Foster Dee Snell; Hon. Treasurer, J. W. H. Randall.

Five new members were elected to the Executive Committee to take the place of retiring members. Those newly elected are Charles N. Frey, Robert J. McKay, A. A. Backus, L. S. Kohnstamm and S. P. Miller.

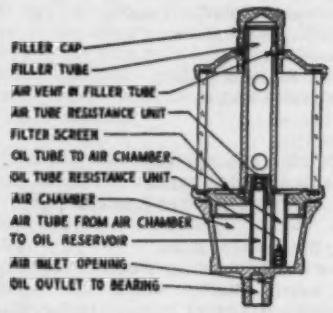
◆ Gair of Canada Acquires Other Box Plants

Robert Gair Company, Inc., announces that its subsidiary, Gair Company Canada, Limited, has acquired the physical assets of Dominion Boxboards Limited, Fibre Boxes Limited, York Paper Mills Limited, Toronto, Ontario, Canada, and a stock interest in Dominion Envelope and Cartons (Western) Limited, the latter having plants at Winnipeg, Manitoba, and Edmonton, Alberta, Canada. This purchase does not include the envelope business of Dominion Envelope and Cartons Limited or its subsidiary, Canadian Wrappers Limited.

◆ Two New Oil Cups

Alemite, a division of Stewart-Warner Corp., Chicago, has announced the introduction of two types of oil cups, one designated as the Alemite Thermatic, and the other as the Microflow cup.

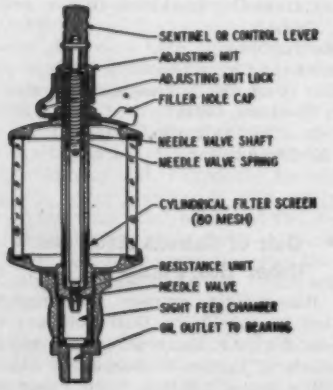
The Alemite Thermatic operates simply by the expansion of air due to normal increase in temperature of a running bearing. A rise of 1.8 deg. Fahr.



is said to put the cup into action. Bearings of idle machinery equipped with this cup are said to be kept lubricated for more than a month without any cup refilling because of the daily fluctuation of room temperatures which starts an occasional flow but never an over-discharge of oil.

Air expansion forces the oil from the bottom of an air chamber, and that supply is replaced from the cup reservoir by gravitational action. An inlet in the base of the cup admits sufficient air to maintain pressure on the oil; while an air vent in the filler tube is placed to prevent dirt from getting into the cup. Foreign particles which may be in the oil when put into the cup are strained out by an 80-mesh filter screen at the bottom of the reservoir.

This cup is suggested by the manufacturer for applications where a constant, slow flow of oil is desired, whereas



the Microflow cup is stated to be particularly adapted to bearings which require a continuous flow of oil in small, adjustable quantities.

A resistance unit, an exclusive feature with the Alemite Microflow cup, is claimed to permit finer adjustment of oil flow and to assure positive operation by preventing clogging. Adjustment is obtained by means of a grooved cylindrical plug through which the oil, strained of foreign particles by an 80-mesh screen, must pass to reach the discharge valve.

Additional new features are a special filler hole cap and a clearer vision sight feed chamber. Both cups are chrome-plated.

◆ Compact d-c. Industrial Analyzer

A new self-contained d-c. industrial analyzer for making practically any type of d-c. voltage, current or resistance test with minimum connections, is announced by Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. The unit is particularly suited for testing industrial motors and control, and consists of an ammeter and a volt-ohmmeter with suitable shunts, multipliers and range changing switches.

The unit is mounted in an attractive and durable portable case with nickel

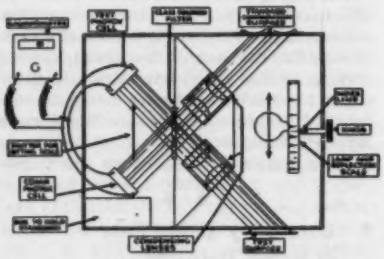
trimmings. A Micarta front panel, which carries all measuring elements and details, comprises the mounting plate. The entire assembly may be removed from the case for inspection by removing four screws.

◆ Photoelectric Reflectometer

A new photoelectric reflectometer which measures the reflectance, opacity and color of paper and other products has been placed on the market by the Henry A. Gardner Laboratory, Inc., 2201 New York Ave., N. W., Washington, D. C. This new reflectometer, a photoelectric adaptation of the Hunter Visual Reflectometer, measures the same quantities, employs the same large sample areas, and operates much faster and with higher precision than the former visual instrument.

The diagram showing the working parts of the instrument demonstrates the null method which makes it possible to operate directly from ordinary current supply. The test surface and a comparison surface are at opposite ends of a light tunnel and are illuminated by a single lamp which is movable between them. Two rectifier-type photoelectric cells are placed so that each receives light reflected at an average of 45 deg. from one of the surfaces. The two cells are connected in series and a galvanometer is connected across them to indicate when one cell generates a current greater than the other. The reflectance scale moves with the lamp past a stationary indicator.

To determine reflectances, a standard is first placed in the test end of the instrument and the lamp is moved to the position for which the scale reading gives the reflectance value of the standard. By means of a compensating shut-



ter, the light falling on one or the other of the photo cells is then reduced until the galvanometer reads zero. When the instrument has thus been adjusted to give the current correct reading for the standard, unknown surfaces may be substituted for the standard and their reflectances measured directly. To obtain color values, reflectances in colored light are determined.

◆ Checkless Lift Truck

Barrett-Cravens Company, 3255 West Thirtieth Street, Chicago, Ill., has brought out a checkless lift truck of four-wheel construction and Hyatt equipped that is designed to carry 2,000-pound loads. The truck can be had in 6, 7, 9 and 11 inch heights and either 18 or 24 inches wide. The length of the carrying frame ranges from 24 to 72 inches, and the lift is 2 inches.

To lift a load with this truck, it is simply necessary to pull down on the

handle; while, to lower a load, a release treadle is stepped on and then the handle lowered to completely disengage a latch. From then on the load is controlled downward through the operator's grip on the handle.

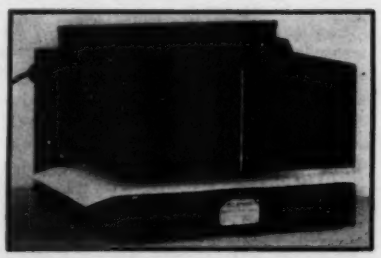
◆ Fuzz Detector

The Hammermill Paper Company, Erie, Pa., has announced the development of an instrument designed to reveal such defects in paper as fuzz, wrinkles, cockles, roughness or grain

and indentations, but with which it also is possible to detect scuffed, picked and streaked surfaces, felt and wire marks, rust from dryer rolls and other surface imperfections of a similar nature.

The instrument, designated as the Fuzz Detector, consists essentially of two 100-watt lamps as a source of light, a viewing table with a surface area of 12 in. by 15 in. and on which the material to be observed is placed, and a suitable housing. The source of light is adjustable to permit its direction at the proper angle over the viewing table. Likewise, an adjustable slit is provided between the source of light and the table and a metal housing placed over the table. The housing, designed to eliminate glare and exclude external light, is provided with an opening through which the sample is viewed and with a door through which a hand can be inserted to facilitate further inspection and to rub the paper surface to ascertain tendency to fuzz.

The paper sample to be tested is placed on the viewing table of the instrument, its surface being viewed by the observer by looking through the opening at the top of the instrument. In this manner a surface area of 12 in. by 15 in. can be examined without further manipulation, or a strip of paper 12 inches wide and of indefinite length can be inspected by passing it through the instrument.



By a single setting of the light source and slit opening, materials of widely varying thicknesses, such as tissues, bonds and bristols, can be examined. Materials of ⅛ in. or more in thickness, the presently designed instrument accommodating thicknesses up to 1 in., require a slight adjustment of the illuminating device. This adjustment can be accomplished in a few seconds.

The length of the instrument is 17 in., width 15 in. and height 10 in.

Additional information regarding the Fuzz Detector will be furnished by the Hammermill Paper Company upon request.

◆ Small-Bulb Gas-Filled Thermometer

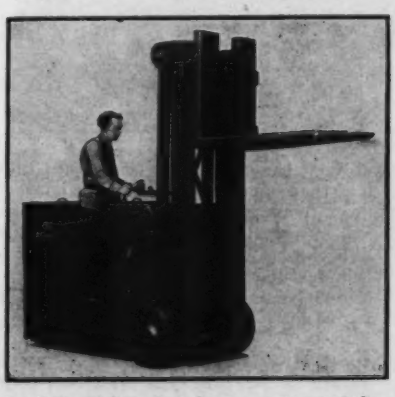
An accurate gas-filled recording thermometer, having a small temperature-sensitive bulb for long lengths of connecting tubing, has been announced by The Bristol Company, Waterbury, Conn. This thermometer, offered for measuring temperatures between -60 deg. Fahr. and 1000 deg. Fahr. where tubing lengths are as long as 100 feet and even longer under certain conditions, consists of a rectangular case in which are mounted two Class III measuring elements, connected through a compensating mechanism. Two capillary tubes, filled with the same gas, run from each element through one armor tube to the sensitive portion of the bulb. Only one capillary tube is connected to the temperature-sensitive bulb.

The other is closed at the bulb end. Both capillary tubes, being adjacent, are subjected to the same temperature changes. Through the compensating mechanism, the tube and element not connected to the bulb correct for temperature changes along the connecting tube and in the case. In other words, the tube and element not connected to the bulb produce a balancing action which offsets the effect of temperature variations along the tube and around the measuring element connected to the bulb.

The thermometer is offered with one or two pens in the 12-inch chart size; and with one pen only in the 8-inch chart size.

◆ Heavy Duty Electric Truck

A new heavy duty center control tiering fork truck of 10,000 pounds capacity, which will operate in 94-inch intersecting aisles, has been announced by the Automatic Transportation Company, 101 West Eighty-Seventh Street, Chicago, Ill. It is front wheel driven, compact, and of rugged construction with the operator having clear vision of all operations. The machine is adaptable to the handling of a wide variety of heavy bulky types of material.



◆ New Lower Ratings in Generator Voltage Regulators

Two new, lower ratings in the Type GDA generator-voltage regulators have been announced by the General Electric Company. They are for a-c machines up to 375 kva, at 3600 rpm, and smaller ratings at correspondingly lower speeds. The type designations are GDA-1M and GDA-1.

As in the GDA regulators of higher ratings, the new regulators have no vibrating contacts, the voltage-sensitive element being a form of torque motor balanced against a spring, and controlled by generator voltage. At any applied voltage within the range of the regulator, the armature of the torque motor assumes a corresponding deflection against the restoring torque of the spring. This element then remains motionless unless a change in voltage occurs, in which case a proportional change in deflection takes place. The action of the regulator is stabilized by a transformer-type stabilizer. This device obviates the need for dashpots or other anti-hunting devices.

Response of the torque motor element is fast and possesses a flat characteristic

with respect to load, frequency, and temperature. In all the regulators, the regulating system remains at rest unless an actual change in generator excitation becomes necessary to maintain voltage.

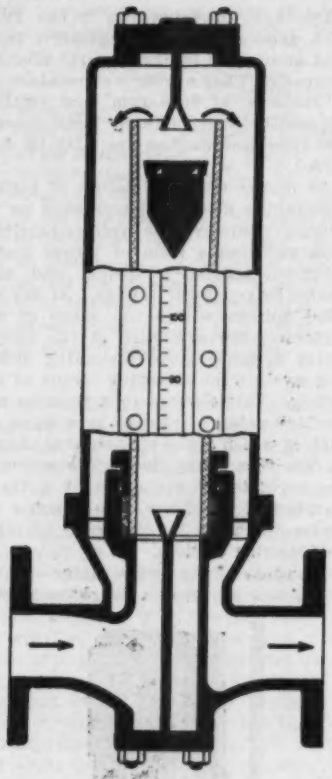
Both new regulators are direct-acting, that is, the rheostatic element is an integral part of the regulator unit and is actuated directly by the voltage-sensitive regulating device. The rheostat is small and compact and is operated directly by the torque motor through a simple linkage.

Only six leads are required for the regulator—two for the potential circuit, two for the exciter shunt-field circuit, and two for the stabilizer. Since the torque motor is a d-c device, a small, full-wave copper-oxide rectifier is used to convert the a-c potential of the generator for application to the torque motor.

◆ Chlorine Metering Device

Schutte and Koerting Company, 12th & Thompson Streets, Philadelphia, Pa., has developed a new balanced pressure Rotameter, designated as Fig. 1819, that

is said to be particularly designed for handling chlorine metering problems as encountered in the paper industry. This Rotameter utilizes a Pyrex glass metering tube that is placed inside a metal housing, the housing being provided with two heavy boiler gauge glass sight windows (suitable for 1,500 lb. pressure



per square inch) through which the metering tube and its rotor can be viewed.

The fluid of which the flow rate is to be measured passes upward in the tube, but reverses its direction and flows downward outside it after reaching the top end. Thus the pressure inside and outside the metering tube is balanced, while the metal case is the pressure resisting device.

◆ Waste Heat Feedwater Heater

Worthington Pump and Machinery Corporation, Harrison, N. J., has announced a modernized non-deaerating type of stationary feedwater heater for use wherever exhaust steam is available for heating boiler feedwater. The heater utilizes in its design a patented interchangeable pan system which is said to provide a definite and unchanging flow of water in jets and drops, thus exposing maximum surface of water to the steam. Multi-baffle separators are said to assure oil-free feedwater; while a two-pass filter is claimed to remove all suspended solid matter. The one piece cast iron body, rectangular in form, will operate under 15 lb. working pressure. Pump suction openings are provided on two sides of the heater for convenience of piping hook-up. A non-collapsible ball-float trap takes care of overflow, and proper water level is maintained by an open bucket float, the water being heated, according to the manufacturer, to within 2 deg. Fahr. of the saturated steam temperature within the heater.

◆ Rubber-Tired Floor Truck

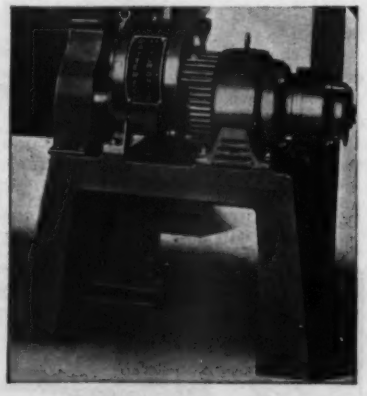
The most recent addition to the floor truck line of the Lewis-Shepard Company, Watertown Station, Boston, Mass., is a truck which is designated as No. 1595-Q type. This truck has a one-piece

steel frame that is arc welded throughout, a smooth flush hardwood top that is steel bound all around, and roller bearings in all wheels and casters. It is balloon-tired.

◆ Pebble Mill Motor Drive

The Patterson Foundry & Machine Company of East Liverpool, Ohio, has just placed on the market a new motor drive for pebble, ball and tube mills, tumbling barrels, rotary mixers, etc.

This new drive is of the built-in motor type with helical gears in the reducing



unit. It has a magnetic brake built into it so that when the stop button is pushed, the mill or cylinder stops immediately, and by pressing the inching button, the mill can be inched over into exact position for discharging and for reloading. The drive is built in all sizes from 1 to 100 hp.

◆ R. H. BURSCH announces his resignation as vice-president of Robert Gair Company, Inc., effective April 30. Mr. Bursch plans to sail for a vacation in Europe in May and will not announce his future plans until after his return.

◆ George L. Erwin, Jr., Joins Crane Co.

Crane Co. announces the appointment of George L. Erwin, Jr., as assistant to P. R. Mork, vice-president in charge of sales.

Mr. Erwin, an engineering graduate of Cornell University, comes to Crane Co. with the benefit of wide experience in sales and advertising. To take up his new duties, he has resigned his position as general sales manager of Kearney & Trecker Corporation, Milwaukee, manufacturers of machine tools.

In his newly created position of assistant vice-president of Crane Co. he will develop sales and market research activities.

◆ Wall Paper Institute Exposition

Announcement is made that the first Wall Paper Institute Exposition and convention will be held at the Waldorf-Astoria Hotel, New York City, July 27 to 31, inclusive.

The exposition will be an instructive and inspirational exhibit designed to promote institutionally the acceptance and use of wall paper. Space is now being reserved and because of the limited number of booths available they will be assigned on the principle of "first come, first served." Exhibitors may lease a minimum of one and a maximum of three booth units.

Applications for space should be addressed to the Exposition Management Office, 232 Madison Avenue, New York City.

◆ Customs Rulings on Imports

That Customs officials at various ports have held several importations of bulky news, colored poster and canary book paper to be dutiable paper, and not admissible as duty free standard newsprint, is announced by the Import Committee on whose complaint investigation of ten separate shipments was made by Customs officials. Most of the shipments were at Pacific Coast and Great Lakes ports.

Efforts by importers of greaseproof paper to have their shipments classified as vegetable parchment have failed at Boston, Philadelphia and New York. By reason of the Belgian trade agreement, the duty on vegetable parchment is only two-thirds of the rate on greaseproof paper.

M. F. Kraft from Sweden is now being held dutiable at the price in the home market. Sales have been made for export at materially below the home market price, such sales being reported to be about 1 cent per pound below the home market price. The same is true of M. G. Sulphite paper.

Importations of fancy papers have been increasing rapidly for the last six months, probably due to the ability of purchasers to secure the glazed and fancy German papers by use of the German barter system by which discounts as high as 35 per cent are often secured.

◆ Fortier New Everett Superintendent

W. J. Pilz, vice-president and general manager of the Everett Pulp & Paper Company of Everett, Wash., recently announced the appointment of L. P. Fortier as superintendent. Mr. Fortier assumed his new duties the middle of April, and he comes to the Pacific Coast with a record of accomplishment in the paper industry of the Middle West and East.

Mr. Fortier succeeds James G. Ramsey who passed away suddenly on February 13 after nearly three years as superintendent of the Everett Pulp & Paper Company's mill.

A practical paper maker since 1910, Mr. Fortier brings to Everett a wealth of experience in the manufacture of high grade papers, particularly in the making of book papers, the principal product of the Everett Pulp & Paper Company.

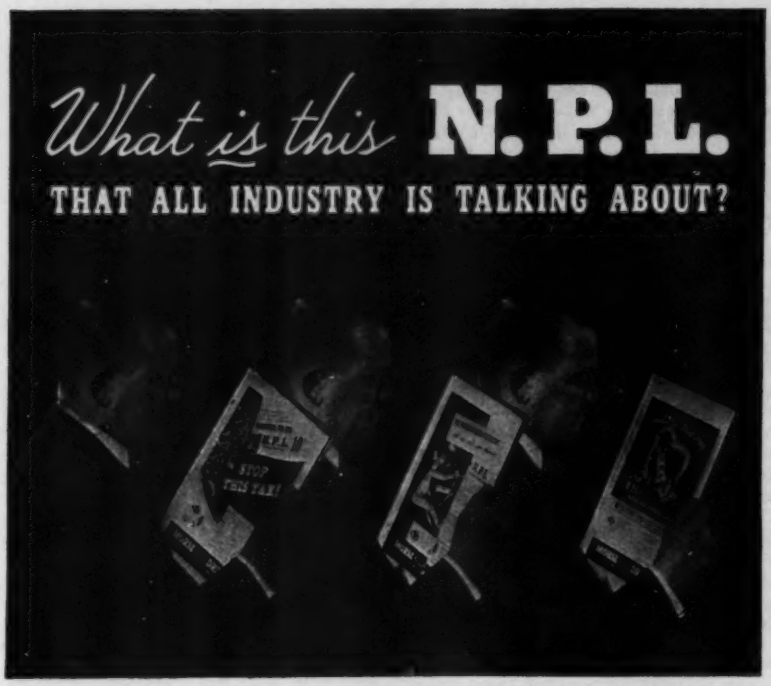
In 1910 Mr. Fortier started as a paper maker with the Orono Pulp & Paper Company at Orono, Maine, and later worked for the Eastern Manufacturing Company of Brewer, Maine, and the American Writing Paper Company at Holyoke, Mass., both makers of fine papers.

Then followed a period of fifteen months' service in the United States Army during the World War. Upon his discharge from the army, Mr. Fortier became superintendent of the Groveton Mills of the Brompton Pulp & Paper Company at Groveton, N. H., where he remained for four years. From Groveton Mr. Fortier moved to Kalamazoo, Mich., to become associated with the Bryant Paper Company, makers of book papers. After three years with Bryant he became general superintendent for the Michigan Paper Company of Plainwell, Mich., makers of book and specialty papers, leaving there after eight years of service to become superintendent for the Everett Pulp & Paper Company at Everett, Wash.

Mr. Fortier's family will accompany him to their new home in Everett.

◆ THE CAREW MANUFACTURING CO., South Hadley Falls, Massachusetts, has appointed J. Norman McDowell of Holyoke, Massachusetts, sales manager of the company. Mr. McDowell has been connected with the Carew Manufacturing Company in a sales capacity since 1927. For several years previous he was eastern salesman for the Fox River Paper Company of Appleton, Wisconsin. Prior to this, Mr. McDowell had some years of manufacturing experience with the Windsor Locks Paper Mills Company, Windsor Locks, Conn.

◆ A NEW series of industrial lubricating oils, known as Stanoil, is being announced by Standard Oil Company (Indiana). The manufacturer claims these oils combine many important characteristics and offer industry an opportunity to simplify lubrication practice. Stanoil is being made in six grades and will gradually replace many of the company's own brands.



FEW industrial sales campaigns have caught the eye of industry executives like N. P. L. (Needless Power Loss). Everybody's talking about it . . . figuring how costly the power losses really are in their plants . . . and how they can be eliminated with Morse Positive Drives.

There is nothing for the profit-sapper, N. P. L., to feed on in Morse Drives. Power is transmitted smoothly, quietly, positively, and economically.

If your plant or the machine you build is suffering from N. P. L., let a Morse sales engineer prescribe.

MORSE CHAIN COMPANY, ITHACA, NEW YORK
DIVISION OF BORG-WARNER CORPORATION

MORSE Positive DRIVES
SILENT CHAIN and ROLLER CHAIN DRIVES • COUPLINGS • CLUTCHES

◆ CUTLER-HAMMER, INC., Milwaukee, Wis., announces the opening of a new office in Baltimore to provide closer contact and better service facilities to customers in the states of Maryland and Virginia. The new office will be located at 10 W. Chase St., Baltimore, and will operate under the supervision of the Philadelphia district office. The Baltimore office will be in charge of R. A. Haworth.

◆ THE GLYCO PRODUCTS CO., INC., New York, N. Y., announce that on and after April 25th, their new address will be 148 Lafayette St. (near Canal St.), New York, N. Y., telephone No. Canal 6-6510. This move has been made in order to consolidate the laboratories, warehouse and executive offices and will provide more efficient service.

◆ THE NEW YORK offices of Hercules Powder Company are now located at 22 East 40th Street, at Madison Avenue.

◆ THE NAME of the Luminous Tube Lighting Corporation has been changed to Barkon Tube Lighting Corporation. This company, located at Textile Tower, Seattle, Wash., will manufacture and sell the Barkon Carbon Dioxide lamp which it is claimed furnishes an accurate reproduction of north sky daylight.

◆ Work Progressing on Addition to Institute

The $100,000 additions to the Institute of Paper Chemistry were put under temporary roof this week, upon the completion of the stonework. Work is progressing now at a speed which almost assures completion of the new portions by commencement, as originally planned.

The new quarters will house additional storerooms, offices, laboratories, and a large east story-and-a-half machine room. The expansion lies to the east and south of the present Institute building, but does not alter the Kimberly Memorial lying just to the west. Available floor-space is almost doubled by the new wings, which with the present building form a hollow square opening to the east so that trucks may deliver supplies and equipment to the doors opening off the inner court.

The new quarters will be informally dedicated and opened to public inspection on June 8, when the Institute and Lawrence college hold their joint commencement exercises. The Ben B. Ganther Co. of Oshkosh are contractors.

◆ PFALTZ & BAUER, INC., have moved their offices from 300 Pearl Street to the thirteenth floor of the Empire State Building to provide adequate facilities for many new activities. A permanent display of scientific instruments will be set up in the new offices where visitors may see a demonstration of their applications.

◆ J. W. LEWIS, who since 1923 has been assistant to President Gerard Swope, was elected treasurer of the General Electric Company at the meeting of the board of directors of the company in New York City on April 24. He succeeds R. S. Murray, who is retiring on May 1 because of ill health, after 43 years' service with the company.

◆ New Catalogues and Publications

Babcock & Wilcox Co., 85 Liberty St., New York City—The following new literature has just been issued: Bulletin G-17-A, features the B&W Integral-Furnace Boiler. The text takes up the principles of design, installation requirements, fuels, etc. The bulletin is profusely illustrated. Another bulletin, No. R-2-D, is devoted to B&W Insulating Firebrick, and bulletin R-1-D covers B&W mortars and plastics.

Barrett-Cravens Co., 3255 W. 30th St., Chicago—Bulletin 130 gives information and specifications on this company's Pallet Lift Trucks. The models are illustrated and there are views of them in operation in various industries.

Black-Clawson Co., Hamilton, Ohio—Some interesting facts about this company's vertical dryers and outstanding installations are set forth in a recent attractive folder which is amply illustrated.

Brown Instrument Co., Philadelphia, Pa.—A very attractive booklet recently issued illustrates and briefly describes the part instruments and controls play in the modern industrial plant. It is entitled "Instruments from the Executive Viewpoint." The booklet is printed in black and silver on a fine quality coated stock. Another attractive piece is a broadside in color, which tells a graphic story of modernization trends in industry.

Dominion Engineering Co., Ltd., Montreal, Quebec—The April issue of this company's magazine "The Dominion Engineer," contains two chapters of interest to paper mill men. One chapter deals with Dominion gears as used in modernizing a book paper machine. The other takes up the subject of "Rubber-covered Table Rolls." The articles are illustrated.

Flexrock Company, 800 N. Delaware Ave., Philadelphia, Pa.—A new folder tells how this company's Ruggedwear Resurfacer is used to replace or patch worn and broken concrete floors and make them safe economically. Trial offer details are given.

Ingersoll-Rand Company, Phillipsburg, N. J.—The I-R Cameron motorpump condensate return unit is fully described and illustrated in a new 8-page bulletin No. 1972-A. There are installation views, plan and elevation diagrams, specifications and tables of sizes.

International Nickel Co., Inc., 67 Wall St., New York City—This company will supply reprints to those interested in receiving them of an article entitled "Nickel-Alloy Gear Materials and Their Heat-Treatments," by J. W. Sands and F. J. Walls, of the company's research department. This article was published in the October, 1935, issue of "Product Engineering."

Lewis-Shepard Co., Watertown, Mass.—A new folder, No. 199, entitled "A Quick Lesson in Materials Handling," takes up the subject of stackers and portable elevators, both hand and power hoist, for stacking and piling cases, crates, barrels, cartons, boxes, etc. A large number of models are pictured as well as views showing the application of some of them. Copies on request.

Linde Air Products Co., 30 E. 42nd St., New York City—Available on request is a 12-page illustrated booklet on the oxy-acetylene welding of brass and bronze. One section of the book is devoted to the technique of fusion welding brass and bronze. There is also an illustrated section on the welding of commercial yellow brass pipe. Joint design and welding technique are discussed in detail. Tables also are given.

Mathieson Alkali Works, Inc., 60 E. 42nd Street, New York City—A new 68-page book entitled "Cutting Costs with Liquid Caustic Soda," will interest chemists and executives in any plant where caustic soda is used. This book presents a study of the economics of the "solid caustic vs. liquid caustic" question and gives much useful information on handling liquid caustic soda. Comprehensive technical data on sampling and analysis methods as well as on the properties of caustic soda and its aqueous solutions adds greatly to the book as a handy reference manual.

Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio—A new 128-page catalogue describes the complete line of spur, bevel, worm and other gears, also motorized speed reducers manufactured by this company. There is useful technical data on gearing, S. A. E. standard heat-treatment methods, and other handy facts.

Policyholders Service Bureau, One Madison Ave., New York City—Companies that use fleets in which trucks of a rated capacity of one and one-half tons or less predominate will find many points of interest in "Operating Costs of Light Duty Trucks," a report recently issued by this Bureau. There are 24 detailed operating cost tables in the report. With but one exception, they are comprised of original recent material taken direct from the operating records of companies that cooperated in the survey. Copies may be obtained by addressing the Bureau of the Metropolitan Life Ins. Co. at the above address.

Propellair, Inc., Springfield, Ohio—The new Propellair Circulator Fan is featured in a new folder. Illustrations of the fans in use are shown and there is a table of catalogue information on the four models available.

Proportioneers, Inc., 9 Codding St., Providence, R. I.—This company's Chlor-O-Feeders for water sterilization are discussed in a new Bulletin No. "SAN" just issued. The midget, heavy and light duty types as well as the portable type are described and illustrated. There also are installation diagrams.

Reliance Elec. & Engr. Co., Ivanhoe Rd., Cleveland, Ohio—Two new bulletins, Nos. 213 and 214, portray the advantages to be found in the fully-enclosed, fan-cooled, Type "T" heavy-duty Reliance motors for direct current. There are illustrations and cross-sectional views accompanying the descriptive text.

J. E. Rhoads & Sons, 35 N. 6th St., Philadelphia, Pa.—Some pointers on Tannate leather belting that the manufacturer claims will save you money are given in a folder just received. The first page of this folder makes an application of a tale about "Uncle Mose's Mule Abe." The material is concisely prepared and illustrated.

The Sims Co., P. O. Box 1096, Erie, Pa.—This company's suggestions how the exhaust heat from an internal combusion engine may be converted into useful service with a Sims economizer are given in a new booklet. Diagrams for suggested connections are shown and for display and readability are printed in yellow and white on black background. There are illustrations, too, as well as descriptive text.

Stephens-Adamson Mfg. Co., Aurora, Ill.—A new catalogue, No. 42, describes the Redler conveyor-elevator manufactured by this company for handling coal, dry chemicals and similar bulk materials. The advantages of this conveyor with drawings of typical arrangements are covered in a very complete manner. There is a double page spread of partial users together with tabulation of materials handled. There are interesting illustrations of installations, a number of diagrammatic drawings and other pertinent data and information.

Sullivan Machinery Co., 307 N. Michigan Ave., Chicago—This company announces a new bulletin featuring its line of unitair compressors which is said to incorporate many advanced features in compressor design. There are a number of illustrations of typical Unitair compressors and specifications.

Thwing-Albert Instrument Co., 3339 Lancaster Ave., Philadelphia, Pa.—A new publication that will interest paper men is "Thwing's Paper Tester," a house organ, the first issue of which has just been released. In this first issue, the technique of checking on basis weight of paper is fully discussed. Subsequent issues will deal with additional topics of interest to the manufacturers, converters, buyers and users of paper and paper products. These articles will be written by outstanding authorities in the paper industry in a style that the average non-technical reader can understand.

Troy Engine & Machine Co., Troy, Pa.—A 48-page catalogue not only covers completely this company's Troy-Engberg steam engines, but contains a great deal of engineering information—tables of data, specifications, diagrams, etc. There are chapters on the uses for the modern steam engine and special advantages of the steam engine drive. The subject of by-product power also is covered. The book is profusely illustrated.

Worthington Pump and Mach'y Corp., Harrison, N. J.—New literature recently issued by this company includes: Bulletin W-475-B12, featuring Worthington external ball bearing, double helical rotary pumps; W-475-B11, on internal roller bearing double helical rotary pumps; W-475-B10, featuring internal sleeve bearing double helical rotary pumps.

A Tell-You and Show-You Convention

F. L. ZELLERS, General Chairman
Superintendents Convention

I AM sure the Convention of the American Pulp and Paper Mill Superintendents June 24, 25 and 26, at the Hotel Pantlind, Grand Rapids, Mich., will be one of our most outstanding in point of program, entertainment and exhibits. Knowing this we are asking all who attend to help us keep it orderly and above all to attend the meetings. We are arranging a very complete program for both the exhibitors and those who wish to see and learn. Never before has a committee of the Superintendents Association had the facilities to exhibit and arrange for an exposition of equipment and supplies such as we have at Grand Rapids. The Allied lines seem to sense this because they certainly are reserving space beyond our expectations. In only four weeks' effort we have disposed of forty-one booths. We arranged for eighty and are sure they will be taken before convention time.

This will be the largest display of equipment and supplies ever held in the Industry. Many of the exhibits will be moving models. To date the space taken is greater than any previous convention. We want all mill executives to know this, we invite them to come, bring their superintendents, see the exposition and attend the meetings which will be arranged to encourage the exchange of ideas, discussion being the keynote.

While the program is not quite complete, the following will give some idea of the quality of this Convention.

Wednesday, June 24

Registration Hotel Pantlind. Be sure to get here early. This will be one of the most interesting opening days you ever attended. Take advantage of the exhibits in the magnificent Civic Auditorium, adjoining the Hotel. Golf for those who wish with prizes. Buffet Lunch at Blythefield Country Club.

Joint dinner at Hotel. Entertainment, golf prizes. After dinner the Western Michigan Tourist Bureau will show technicolor pictures of vacation spots in Michigan and possibly technicolor pictures of Holland in tulip time. After the pictures, dancing.

Thursday, June 25

Opening of the business session in the Civic Auditorium. All business meetings and the exhibits will be held in this building along with the joint dinners.

After the formality of opening, the Session will be turned over to the Miami Valley Division who are planning on a very elaborate program which we will label for the time being as a "potpourri of paper making problems." This meeting will be for the purpose of bringing out general problems and having them solved then and there. Bring your problems along. Miami Valley Division will do a real job of serving you.

Luncheon—No speakers, real entertainment.

The group meetings go into a huddle immediately after the luncheon. All one has to do is to know the chairmen that President Champion has appointed for these group meetings. This tells you the calibre of these group meetings. Every chairman is of high character and outstanding in his field.

Book and Fine Papers—Chairman, Jas. R. Simpson, Champion Paper & Fibre Company. Mr. Simpson has announced the following program:

"Paper Machine Rolls From a Rubber Man's Viewpoint," (illustrated) by W. L. White, director of research, Manhattan Rubber Division of Raybestos, Inc.

"Dealing With Mill Operating Records on Stock Preparation and Production," by R. D. Kehoe, president of Paper and Industrial Appliances, Inc.

"Modernized Board Machines," by Cliff Walton, engineer of Downingtown Manufacturing Company, who will also present a series of motion pictures to illustrate his talk.

S. E. Tomczak, chairman of the Sulphite Pulp Group, has announced the following program:

Strict adherence to exacting production standards has placed SOLVAY Liquid Chlorine to the fore as the bleaching agent upon which the industry can depend. Always full strength, always pure, always uniform—it meets *every* quality demand.

In service and distribution, too, the name SOLVAY is your guarantee of fast, sure, on-time deliveries. Full information and prices on request. Ask for *free* copy of 44-page book on "Solvay Liquid Chlorine."

SODA ASH—Graded to meet every need of the industry and produced to conform to SOLVAY standards. Light—Dustless Dense—Extra Light (Fluf).

Caustic Soda (Solid, Flake, Ground, Powdered, Liquid)
Calcium Chloride — **Special Alkalies**
Modified Sodas — **Sodium Nitrite**
Caustic Potash (Liquid, Flake, Ground, Solid, Lump)
Ammonium Chloride — **Ortho-dichlorobenzene**
Para-dichlorobenzene — **Ammonium Bicarbonate**
Potassium Carbonate (Liquid 47%—Granular Hydrated 83-85%—Dustless Calcined 98-100%)

SOLVAY SALES CORPORATION
Alkalies and Chemical Products Manufactured by The Solvay Process Company
40 Rector Street — **New York**

BRANCH SALES OFFICES:
BOSTON, CHARLOTTE, CHICAGO, CINCINNATI, CLEVELAND, DETROIT, HOUSTON, INDIANAPOLIS, KANSAS CITY, PHILADELPHIA, PITTSBURGH, ST. LOUIS, SYRACUSE, NEW YORK

Pulp and Paper Mill Screens

of STAINLESS STEEL—COPPER—BRONZE—MONEL—CHEMICAL RESISTING ALLOYS

Perforations that are accurate in size and alignment
ANY METAL •• ANY PERFORATION

The Harrington & King PERFORATING Co.

5654 Fillmore St., Chicago, Ill., ◆ 114 Liberty St., New York, N.Y.

PULP MILL MACH'Y ◆ FINISHING ROOM MACH'Y
◆ FRICTION CLUTCHES ◆

THE MOORE & WHITE CO.
PHILADELPHIA, PA.
S. PHILA. STA. PENNA. R.R.
MACHINERY

Ideal "Jumbo Model"

SUPER-POWERED!

Blows--Vacuums--Sprays

Unsurpassed performance—extraordinarily powerful—full 1 H. P. motor blows a low pressure blast of dry air at 276 M. P. H. Hundreds used by paper making plants.

Free Trial

IDEAL COMMUTATOR DRESSER CO.
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"READY DRESSED" **MILL COGS**

LABOR SAVING—TIME SAVING

THE MOST ECONOMICAL FILLINGTHAT CAN BE PUT IN A MORTISE WHEEL
Ready Dressed
Blank Head
WE MAKE ANY STYLE OR SIZE WANTED
WRITE FOR INSTRUCTION SHEET "O" WHICH IS FREE

QUICK SERVICE ON ALL SIZES

THE N. P. BOWSHER CO., So. Bend, Ind.

WANTED—Tub sizing equipment for two fourdrinier machines—one with 77″ face by 36″ diameter dryers—the other with 67″ face by 36″ diameter dryers. Also four or five dryers of each of the dryer sizes mentioned above. Address Box 239, THE PAPER INDUSTRY.

WANTED—Position as superintendent in light chipboard and strawboard mill. Experienced as follows: machine work, 9 years; tour boss, 4 years; past 5 years, superintendent. Address Box 240, THE PAPER INDUSTRY.

CARTHAGE MACHINE CO.
Carthage, New York
« « «
Machinery for Ground Wood and Chemical Pulp

For The Papermaker's Library

Pulp Bleaching—a symposium.

Papermaking Research Around the World, by Dr. Louis E. Wise.

Identification and Microscopy of Woods and Wood Fibers Used in the Manufacture of Pulp, by Ellwood S. Harrar and J. Elton Lodewick.

Lessons in Paper Making, Part 1, by Harry Williamson.

Lessons in Paper Making, Part 2, by Harry Williamson.

Practical Helps for the Mill Man.

Each one of these publications contains a wealth of information, and they are priced at only fifty cents per copy prepaid.

THE PAPER INDUSTRY
333 North Michigan Avenue
CHICAGO • ILLINOIS

"New Developments in Bleaching Sulphite Pulp," by Dr. T. A. Pascoe, Northwest Paper Company, Cloquet, Minn.

"Waste Sulphite Liquor," by Guy C. Howard, Marathon Paper Mills, Rothschild, Wis.

"Continuous Cooking of Sulphite Pulp," by H. D. Wells, American Paper Machinery & Engineering Works, Glens Falls, N. Y.

C. E. Stoke, who is chairman of the *Sulphate and Soda Pulp Group*, has announced that R. M. Radsch of the Appleton Machine Company, Appleton, Wis., who was formerly superintendent of the Thilmany Pulp and Paper Company, will present a paper on "Modern Trends in Kraft Pulp and Paper."

Soda and Sulphate Pulp—Chairman, C. E. Stoke, Tomahawk Paper Co.

Ground Wood—Chairman, Sidney D. Wells, Combined Locks.

Sulphite—Chairman, S. E. Tomczak, Flambeau Paper Co.

Board—Chairman, J. H. Brougham, Penn Fibre-Board.

Tissue—Chairman, H. H. Harrison, Crystal Tissue.

Joint Dinner at Auditorium. Entertainment—Speaker, Dr. Merton Rice of Detroit. Dr. Rice is the fiery type speaker and has a real message. He comes to us very highly recommended, especially by Jacob Kindlebager and Ralph Hayward of the Kalamazoo Vegetable Parchment Co. After the dinner meeting dancing will again be in vogue.

Friday, June 26

General Session. This meeting is being arranged with the thought of having the printers and jobbers of Michigan attend. We have in mind one of the most vital problems in the printing and paper industry today. More about this later. Grover Keeth, Marathon Paper Mills, Rothschild, Wisconsin, will make his report to the association relative to his attendance at the National Safety Conference.

Luncheon—No speakers. More real entertainment. The regular business session. Election of officers. Report of Committees, etc.

F. J. Sensenbrenner, President of the American Paper & Pulp Association, and President of Kimberly-Clark Corp. Mr. Sensenbrenner assures me he will be with us if at all possible.

Joint Dinner at Auditorium. Entertainment. Presentation of Past President's Jewel. Presentation of the L. D. Post Trophy. Main Speaker, Chas. Milton Newcomb. I think one recommendation which I received personally from the Secretary of the Chicago Executives Club is sufficient. It states: "Mr. Newcomb can hold his audience for ten minutes or three hours. We think so much of him we have had him back eight times." Need we say more about Chas. Milton Newcomb. Wind up with dancing. Everything semi-formal.

The entertainment for the three days is in the capable hands of Francis D. Bowman, advertising manager of the Carborundum Company, Niagara Falls, New York. He is the chap who writes, arranges and announces the Carborundum Band Program over the Columbia Broadcasting System. He assures me he has some high class radio acts lined up. You tell me, are we going to have entertainment! Sorry there will be no stag parties. This year we cater to the best in you, and to the ladies.

On account of moving to Everett, Wash., where Mr. Fortier is now superintendent of the Everett Pulp and Paper Company, Mrs. Paul Fortier will be unable to head the Committee on Ladies Entertainment. This place will be taken jointly by Mrs. Daniel Stacy and Mrs. Marie Cady, both of Grand Rapids. And are the ladies going to enjoy themselves! The first day will spent at the Hotel. Rest up from their trip to Grand Rapids and get acquainted. The mezzanine floor of the Hotel is theirs on Wednesday.

One whole day at Blythefield Country Club. Golf if they want, swim in the finest pool in Michigan, bridge or what have you. Also some good entertainment out there. The other day will be just as delightful but is not fully arranged. However, we want the ladies to know there will be no tiresome bus journeys. The exhibitors will be allotted time on Thursday and Friday also. With a program like this is it any wonder reservations for space to exhibit and hotel reservations are coming in?

One of the interesting features of the Paper and Pulp Ex-

WARREN PUMPS
move heavy stock
Smoothly...
without Clogging

Warren Pumps are *built* to handle 6% clean stock — or even heavier — efficiently, without clogging and at rock-bottom power costs. A self-cleaning, non-binding impeller, designed by Warren engineers, prevents stock from packing behind the impeller and binding the pump. Shutdowns from this cause are virtually eliminated.

In many mills where stock handling conditions are known to be severe, Warren Stuff Pumps equipped with this impeller have given many years of dependable service . . . *saved thousands of dollars.* You'll find it profitable to call in a Warren engineer for recommendations before you install a new pump or replace an old one. Write for the latest bulletin describing Warren Stuff Pumps.

WARREN PUMPS

WARREN STEAM PUMP CO., Inc.
WARREN, MASSACHUSETTS

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Plans and Specifications

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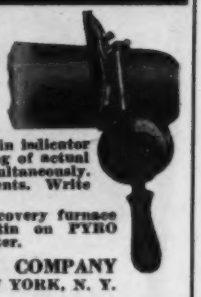
Hardy S. Ferguson—*Member A.S.C.E. A.S.M.E. E.I.C.*
Moses H. Teaze—*Member A.S.C.E. A.S.M.E. E.I.C.*
J. Wallace Tower—*Member A.S.C.E. A.S.M.E.*

Consultation, reports, valuations, and complete designs and engineering supervision for the construction and equipment of

PULP AND PAPER MILLS
AND OTHER INDUSTRIAL PLANTS
STEAM AND HYDRO-ELECTRIC
POWER PLANTS
DAMS AND OTHER HYDRAULIC
STRUCTURES

PYRO THE IMPROVED SURFACE PYROMETER

A SELF-CONTAINED, RUGGED, QUICK-ACTING, ACCURATE AND SCIENTIFICALLY DESIGNED PRECISION INSTRUMENT FOR CURVED OR FLAT, STATIONARY OR MOVING SURFACES.



Due to patented clamping-device embodied in indicator —A PYRO FEATURE—contact and reading of actual temperatures no longer have to be made simultaneously. Extension handles to meet your requirements. Write for bulletin No. 60.

For coal ash fusion determinations and recovery furnace temperatures, etc., request special bulletin on PYRO OPTICAL or PYRO RADIATION pyrometer.

THE PYROMETER INSTRUMENT COMPANY
104-109 LAFAYETTE ST. NEW YORK, N. Y.

The best test of the value of a Fourdrinier wire is on a paper machine. There can be no substitute for that experience.

Lindsay Fourdrinier Wires

successfully meet that test. We furnish them in *Longcrimp* and *Modified Longcrimp, Duo-Wear* and *Regular Weave.*

The Lindsay Wire Weaving Co.
14025 Aspinwall Avenue Cleveland, Ohio

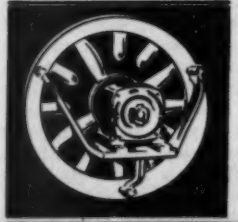
THE NEW **FULTON SYSTEM**
FOR
BOARD • KRAFT • STRAW
MACHINES

1. Increases Production from 10% to 30%.
2. Saves up to 50% in Steam Consumption.

Write for Bulletin No. 40.

Midwest-Fulton Machine Company
DAYTON, OHIO

Fans



Adopt International fans to draw the steam out of your machine room so you can dry your sheet faster and more uniformly. Less cockling. Fewer breaks. Better drying conditions make for greater speeds and higher tonnage. These fans eliminate air swirls at propeller tips and rate greater capacity per fan diameter than other fans of same general type. Sizes 12″ to 84″.

Bulletins and names of user mills upon request.

INTERNATIONAL ENGINEERING, Inc.
DAYTON, OHIO

INTERNATIONAL

CHEMIPULP PROCESS, INC.

CHEMICAL PULP MILL ENGINEERS
CHEMICAL PULPING PROCESSES, OPERATING SURVEYS
APPRAISALS ESTIMATES
WOOLWORTH BUILDING
WATERTOWN, N. Y.
CANADIAN AGENCY: 319 CASTLE BUILDING, MONTREAL, P. Q.
PACIFIC COAST OFFICE: 3311 FIRST AVE., SOUTH, SEATTLE, WASH.

VEST POCKET POWER PLANTS

Small space occupied, any capacity, low over-all operating costs, high and extreme efficiencies, reliability, low initial investment.
Complete power plants to meet any operating conditions of Pulp and Paper mills or other Industrial service. Engineering and Construction.
Satisfactory Services Always Guaranteed.

FERGUSON ENGINEERS
Power Specialists
Monadnock Bldg., Chicago

DRY PAPER EVENLY

STICKLE AUTOMATIC STEAM CONTROLS
DRAINAGE SYSTEMS FOR DRYERS AND HEATING SYSTEMS
CONDENSATION ECONOMIZERS FOR HEATING AIR
DEAERATING FEED WATER HEATERS, REDUCING VALVES
STEAM TRAPS, OIL AND STEAM SEPARATORS

STICKLE STEAM SPECIALTIES COMPANY, 2217 VALLEY AVENUE, INDIANAPOLIS, IND.

position in the Civic Auditorium at Grand Rapids will be that of The Yale & Towne Manufacturing Company, 4530 Tacony Street, Philadelphia, Pa., who will present a complete line of their Electric Industrial Trucks, Hand Lift Trucks, Skit Platforms and Chain Hoists. Representatives at the exposition will be: T. F. Moriarty, W. T. Keller and F. G. Nyman.

The exhibit of Joseph T. Ryerson & Son, Inc., of Chicago, will cover all the general steel lines and many special alloys used by the paper and pulp industry. Special emphasis will be placed on Ryertex Bearings,—a water lubricated plastic bearing particularly adapted to pulp and paper mill equipment. There will also be an interesting display of chromium nickel and chromium nickel molybdenum, low carbon castings made to take care of corrosion resistance in certain paper mill applications. Representatives of Joseph T. Ryerson, Inc., at the Pulp and Paper Exposition will be: Mr. MacGill, Mr. VanDyke, Mr. Basse, Mr. Anderson and Mr. Logan.

Among the new exhibitors who have reserved space are: American Brass Company; Cameron Machine Company; S. K. F. Industries, D. J. Murray Mfg. Co., Durametallic Corp., Gilbert & Nash Co., Appleton Machine Co., Great Lakes Supply Co., Horton Mfg. Co. and Gaetke Corp.

Of the eighty exhibit spaces available, fifty-three have already been reserved, and more than three hundred reservations for rooms at the Hotel Pantlind have also been received. All those planning to attend the convention or to exhibit should send their hotel reservations immediately to the Pantlind Hotel and the exhibit reservations to S. R. Atkinson, Executive Secretary, P. O. Box 237, Niles, Mich.

◆ Frank A. Juckett Elected President of Sandy Hill Iron & Brass Works

At the annual meeting of The Sandy Hill Iron & Brass Works, Hudson Falls, N. Y., held May 1, Frank A. Juckett, South Lee, Mass., was elected president to succeed the late Archie J. Kennedy.

Officers re-elected were: Dr. Richard C. Tefft, Jr., Boston, vice president; W. J. Elliot Simpson, Hudson Falls, secretary and treasurer. Harry L. Broughton and Chas. W. Kellogg, of Hudson Falls, together with the above named officers were named as directors for the ensuing year.

◆ National Power Show in December with Annual Meeting of A.S.M.E.

The management of the National Exposition of Power and Mechanical Engineering has announced that the 12th Exposition will be held from November 30th to December 5th, inclusive, co-incidental with the annual meeting of the American Society of Mechanical Engineers.

The exposition this year is expected to be more comprehensive than in the past. The improvement in business will be one influence, and the great interest which manufacturers have developed in their products through research developing new products and improvements on standard products will make the exposition very interesting. There will be large and heavy equipment from equipment used in the generation of power, its distribution and utilization through mechanical equipment for handling materials, tools and various other mechanical devices. There will be the usual large grouping of refractories, stokers, burners and fuel burning equipment of various types, boilers and power generating equipment, engines, pumps and steam equipment, piping, valves, fittings, showing all the recent developments in these lines, and supplies used co-incidental thereto, instruments of precision for control and measurement of volume, speed, rate of flow, pressure, time and other numerous factors which must be known in industrial operations. There will be the whole range of material supplies, lubricants, packing, belting and other incidental products.

The management now report that over 100 of the former exhibitors have already reserved space and applications are being received daily, that approximately one and one-half floors of the great Grand Central Palace have already been engaged and it is expected that three floors will this year be used for the exposition.

Fabricated
STAINLESS
FITTINGS

have advantages in
WALL THICKNESS
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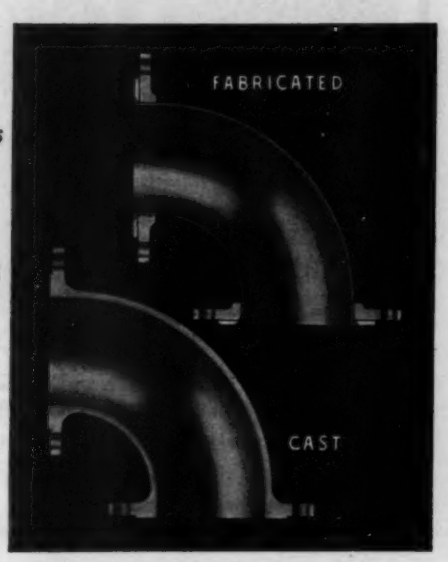
COST



Note the differences in a Pittsburgh Piping fabricated stainless fitting and a stainless cast fitting.

The wall thickness of the fabricated fitting is only 1/8". Since the flange is not in contact with fluid being carried, it is of forged steel. If joint is subject to corrosive fumes from outside, a flange of stainless alloy or a stainless welding fitting is used. The stainless lap protects against seepage which might occur in the joint.

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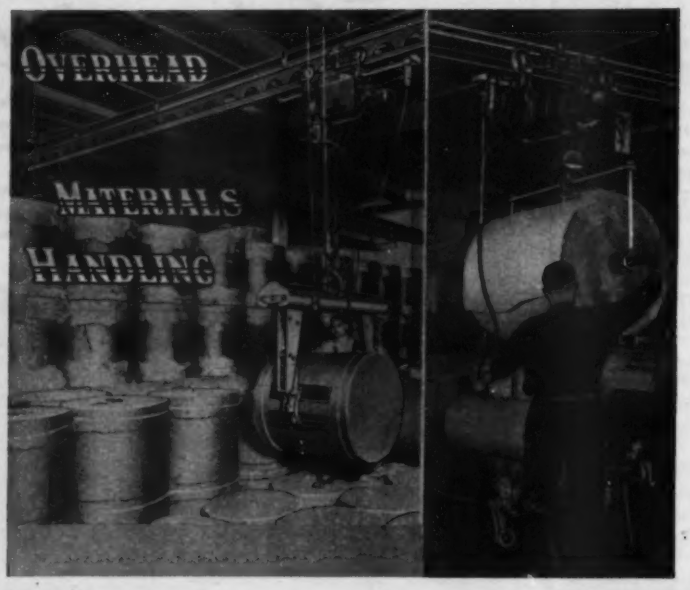

Photo 2334 Photo 2284

Photo 2334 — A Hand Propelled Carrier with Floor Controlled Electric Hoist and Roll Grab Handling Rolls In and Out of Storage.

Photo 2284 — Roll Handling at Bag Machines.

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The Paper Industry Safety Contest

July 1, 1935 to June 30, 1936

Cumulative Scores as of March 31

19 Perfect Scores

PERFECT SCORES

Division I—Paper and Pulp Mills

	PARTICIPANT	MILL	LOCATION
GROUP A			
GROUP B	Hollingsworth & Whitney Co.	Algonquin & Tasconnet	Waterville, Me.
GROUP C			
	International Paper Co.	Little Island	No. Tonawanda, N. Y.
	Continental Paper & Bag Corp.	York Haven	Pennsylvania
	Finch, Pruyn & Co., Inc.	Glens Falls	New York
GROUP D			
	Harriman Company	Harriman	Tennessee
	International Paper Co.	Webster	Orono, Maine
	Hollingsworth & Whitney Co.	Arcostook & Cobbossee	Gardiner, Me.
	Bird & Son, Inc.	Phillipsdale	Rhode Island
	U. S. Gypsum Co.	No. Kansas City	Missouri
	Spaulding Fibre Co., Inc.	Milton	New Hampshire
	Central Fibre Prods. Co.	Vincennes	Indiana
	Hollingsworth & Whitney Co.	Abenaquis	Madison, Me.
	Central Fibre Prods. Co.	Mt. Carmel	Illinois
	Mead Paperboard Co.	Rockport	Indiana

Division II—Remanufacturing

Union Bag & Paper Corp.	Specialty	Hudson Falls, N. Y.
Kimberly-Clark Corp.	Atlas	Appleton, Wis.
Texas Corrugated Box Co.	Dallas	Texas
U. S. Gypsum Co.	Genoa	Ohio
Bemis Bros. Bag Co.	East Pepperell	Massachusetts

IMPERFECT SCORES

	Key Number	Rank	Disabling Injuries	Frequency Rate
GROUP A	P- 55	2	3	1.464
	P- 30	3	7	4.935
	P- 44	4	8	6.490
	P- 27	5	15	6.567
	P-101	6	8	7.531
	P- 19	7	9	7.762
	P- 67	8	14	7.810
	P- 12	9	9	8.337
	P- 2	10	9	8.751
	P- 10	11	10	8.809
	P- 1	12	17	9.217
	P- 18	13	14	9.601
	P- 13	14	13	9.647
	P- 78	15	12	10.223
	P- 62	16	16	10.488
	P- 69	17	15	11.309
	P- 64	18	14	12.741
	P-102	19	22	14.949
	P- 23	20	17	16.746
	P- 95	21	22	21.413
	P- 73	22	34	22.236
	P-114	23	28	24.093
	P- 40	24	26	27.969
	P- 87	25	38	31.198
	P- 74	26	51	33.587
	P- 71	27	64	61.871
GROUP B	P- 70	1	1	1.136
	P- 15	2	1	1.438
	P- 11	3	2	2.940
	P- 68	4	3	4.071
	P- 22	5	4	5.309
	P- 51	6	4	6.485
	P- 26	7	6	7.131
	P- 31	8	7	8.088
	P-112	9	6	10.167
	P- 21	10	8	10.288
	P- 25	11	12	13.388
	P- 54	12	8	14.543
	P- 60	13	10	14.631
	P- 3	14	9	14.949
	P- 16	15	10	15.214
	P- 82	16	13	17.559
	P- 45	17	21	31.691
	P- 76	18	19	31.738
	P-104	19	20	36.091
	P- 33	20	35	44.775
	P- 77	21	38	59.976
GROUP C	P- 97	4	1	3.364
	P- 46	5	2	4.010
	P- 52	6	2	4.972
	P- 61	7	2	5.381
	P- 59	8	3	5.753
	P- 72	9	4	7.476
	P- 43	10	3	9.046
	P- 17	11	5	14.059
	P- 47	12	5	14.541
	P- 88	13	7	15.274
	P- 37	14	6	15.689
	P-103	15	5	16.959
	P- 75	16	9	20.687
	P- 29	17	9	22.082
	P- 48	18	9	22.542
	P- 4	19	12	23.401
	P- 49	20	7	23.472
	P- 41	21	9	23.724
	P- 89	22	10	26.720
	P-111	23	9	26.743
	P- 34	24	8	27.319
	P- 33	25	17	43.842
	P- 14	26	13	44.385
	P-107	27	12	47.323
	P-113	28	26	58.663
	P- 50	29	21	74.502
GROUP D	P- 7	11	1	4.362
	P- 92	12	1	12.118
	P-117	13	3	14.496
	P- 66	14	1	14.779
	P- 85	15	1	16.741
	P- 81	16	4	18.172
	P- 83	17	3	19.190
	P- 6	18	5	19.637
	P- 65	19	2	20.513
	P- 36	20	3	31.112
	P-118	21	4	22.100
	P-116	22	6	24.568
	P- 8	23	3	25.519
	P- 42	24	4	26.976
	P- 90	25	4	27.718
	P- 94	26	6	29.666
	P- 98	27	8	38.280
	P-106	28	9	40.798
	P- 99	29	5	41.353
	P- 80	30	11	43.157
	P- 24	31	7	43.213

Division II

R- 5	6	5	6.843
R-11	7	1	7.151
R-20	8	6	7.829
R-18	9	2	8.518
R- 1	10	3	9.947
R- 6	11	9	10.070
R- 3	12	2	10.953
R- 9	13	2	11.174
R- 2	14	7	11.837
R-21	15	9	13.765
R-10	16	10	23.737
R-14	17	4	43.087

No March report: P-32, P-34, P-36, P-37, P-54, P-64, P-65, P-66, P-92, P-111, R-5.

Withdrawn: P-70, P-83.

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You will find that Orr felts last longer—reducing the annual felt bill by hundreds, perhaps thousands of dollars.

The above statements can very easily be proved—have been proved in mills sufficiently interested to conduct operating tests—first on one make of felt, then on another.

Put on a test in your own mill. Give the Orr brand of felts an opportunity to prove that they are a superior make.

Complete line in all required sizes and weaves, including endless felts for the very largest machines.

The ORR FELT and BLANKET COMPANY
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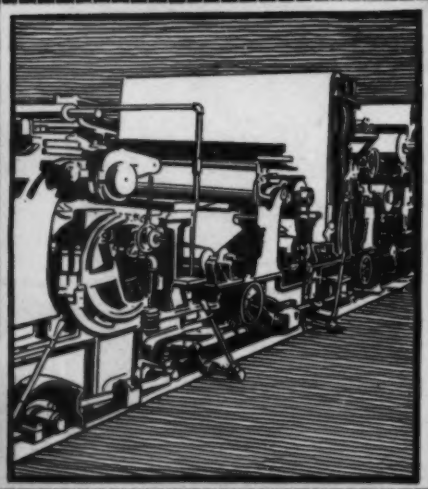
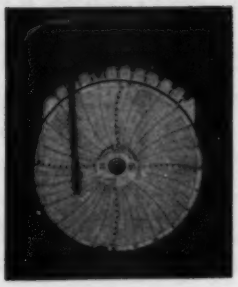


ORR FELTS

COCHRANE FLOW METERS



Above is shown indicating, recording and integrating Electric Flow Meter

COCHRANE FLOW METERS whether Mechanical or Electrical, are distinguished by their exceptional accuracy. Such accuracy in an Electrical meter is unusual, when coupled with the ruggedness built into the Cochrane. The secret lies in the Galvanometer Null Principle, long recognized as the most accurate means of measuring a force or quantity, and now utilized for the first time in the measurement of fluid flow.

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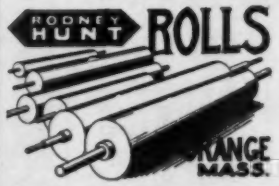

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POWER

GENERATION + UTILIZATION + MAINTENANCE

This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.

By W. S. JOULE

◆ Caustic Embrittlement

Authorities differ as to the cause of embrittlement, but the commonly accepted theory is that caustic soda works its way into the seams of the boiler drum or shell and by its action in this condition, nascent hydrogen is released and absorbed by the iron or steel. This changes the structure so that it becomes similar to cast iron and, therefore, brittle. Most trouble of this nature is found in those western states where the water is naturally alkaline. It should be remembered that it is not necessary that caustic soda be present in the feed water; if normal carbonate or bicarbonate be present, these may change under the action of heat and pressure into the caustic form, the conversion amounting to as high as 80 per cent, depending on the pressure and the amount of organic matter present; the former aids the change and the latter retards it. Obviously, the remedy is to remove the salts which cause causticity.

◆ Are You Burning the Right Fuel?

It is as truly an economic waste of our national resources to burn the wrong fuel as it is to burn a fuel wastefully. A coal burning furnace operated at 65 per cent efficiency when with the same equipment 75 per cent could be realized shows no poorer judgment than to burn coal when an accurate analysis of all costs will show that a saving of 10 per cent could be made by burning oil.

Too often we learn of changes being made from one fuel to another based entirely upon fuel costs delivered to the plant. This, of course, is the most simple comparison to make. It is, however, absolutely inadequate and misleading, in fact it is merely the starting point of a problem which is complex, due, in a great measure, to unstable conditions of the fuel market.

To make a true comparison every item such as fuel and installation costs, labor, cost, fuel handling charges, furnace and equipment maintenance and investment charges must be considered in their full value. As a concrete example, consider the replacement of stokers by oil-burning equipment. The first question to arise is whether the stokers have been operated to their best advantage. If they have, then what disposal will be made of them when taken out of service. Are you sure you will not want to go back to coal burning when a change comes in the fuel market? That is a pretty hard question to answer. The stokers may be sold to defray a part of the new equipment costs, but if you keep the stokers for future requirements then you must charge operating costs with interest on the stoker investment.

It makes no difference from what angle the problem is approached it is one which resolves itself into a detailed analysis of past investments, present costs and an anticipation of what the future fuel market will bring. It will, no doubt, pay a great many operators to give contemplated changes more careful thought and study.

◆ A Clear Stack May Indicate Excess Air

One of the principal causes of smoke is lack of sufficient air at the proper temperature at the point where the volatile gases from the coal should be burned. This being the case, it is evident that by observing the smoke emitted by the chimney, one can form an approximate idea as to the effectiveness of combustion. An excess of dense, black smoke is in all cases an indication of inefficiency. At the same time, it must be remembered that an entire absence of smoke does not necessarily indicate perfect combustion, for it may be that a great excess of air is being supplied, resulting in an even higher loss than would be caused by combustion producing smoke.

◆ Delivery of Feed Water to Boiler

In the design of a boiler installation care must be taken to locate the feed pipe properly. The method of discharging feed water into boilers has two important bearings upon the economy in the boiler room; these are to help increase circulation and to deposit the sediment where it will be least harmful.

Before the water is discharged into the drum it is well to lead the pipe around through the water space a turn or two in order to heat the water so that when it comes in contact with the heating surfaces it will cause no serious contracting strains in the boiler metal. When finally discharged from the pipe, it should be in that part of the boiler where the least evaporation takes place and in the direction which is the natural circulation for the water in the boiler at that point. By this simple arrangement the circulation is increased and the deposits are washed to that part of the boiler just over the blowoff where they can do the least damage, and are easiest removed.

On account of the comparative coolness of the incoming feed water, the discharge should not be located near a riveted joint or furnace sheet. Should the discharge be so located, the cool feed water would chill and contract the plate or seam upon which it is permitted to discharge. The local contraction thus produced would cause severe straining of the metal.

In any case, the underlying principle to be kept in mind when installing the feed line to a boiler is that the change in temperature of the feed water should be as gradual as possible. The feed water should be discharged in that region of the water space where the ebullition is least violent.

◆ A REASONABLE slackness for engine bearings from 6 to 12 in. in diameter, is about 0.005 in.; for crankpin and crosshead pin bearings up to 4 in. in diameter about 0.004 in. These dimensions can easily be approximated by setting the bearing up tight, then slacking back a certain number of faces on the wedge-bolt head, depending upon a number of threads and the taper of the wedges.

◆ Emergency Handling of Hot Bearings

If you have a hot box on a main engine bearing, first loosen it up a little all around and then give it a generous dose of cylinder oil through the feed holes, but don't try to feed it through the ordinary oil channels, they are too small. If this oil sticks to the shaft it is apt to cure trouble.

Another good remedy is a mixture of graphite and oil—one part of graphite to ten of oil. But do not feed this until the graphite has been thoroughly wetted. Dry graphite will not help a hot box.

If there is no graphite handy, use flowers of sulphur in the same way; or, failing in that, try ground talc. This should be mixed with oil in the same proportions, one of powder to ten of oil, and the dry part of the mixture must be thoroughly wetted before it is applied.

In aggravated cases, a stream of water from a hose will accomplish a good deal in bringing down a bearing's temperatures, or ice may be used, packing it around the bearings.

A PAPER MA

ALUM

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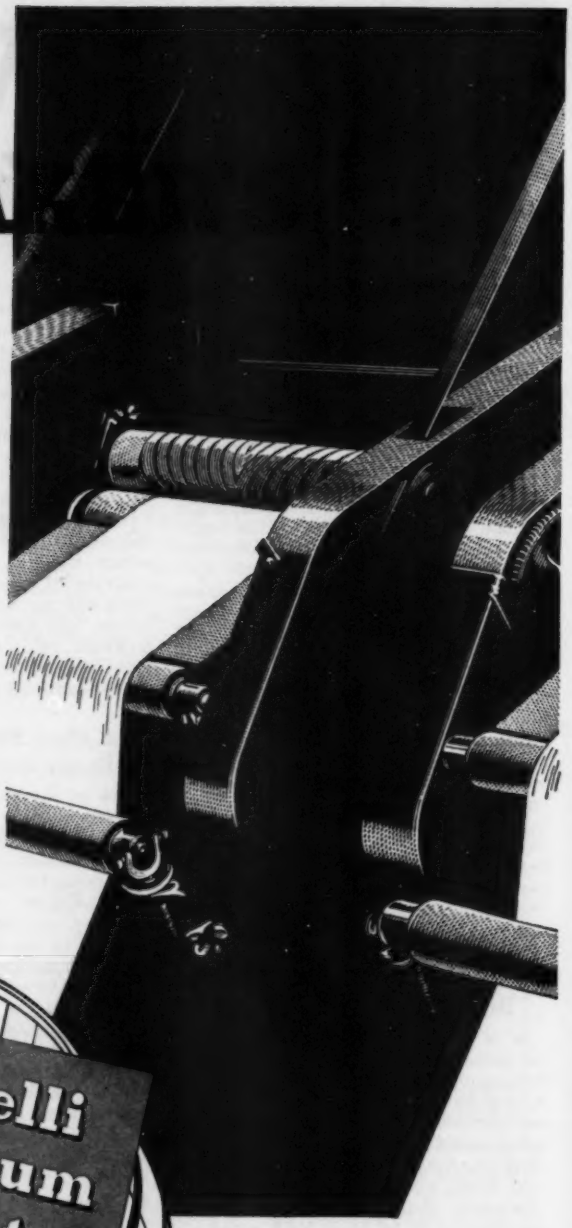

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Barium Sulphate (Blanc Fixe)	Salt Cake
Bleach	Silicate of Soda
Caustic Soda	Soda Ash
C. P. Ammonium Hydroxide	Sulphuric Acid
	Tri-Sodium Phosphate

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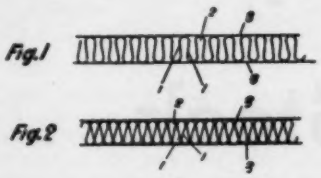
TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press.

IN THE PAPER INDUSTRY

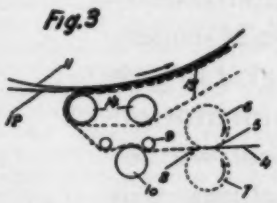
◆ Corrugated Board

In order to insure greater rigidity of corrugated board the form of the undulations is modified as shown in cross-section in Figures 1 and 2. This is accomplished by a mechanism which can be attached to any corrugating machine of the ordinary type without preventing their use for the usual kind of corruga-



tions. This mechanism effects a constriction of the undulations produced by the grooved rolls generally employed by having these rolls driven at a faster speed than that at which the liner is fed into the machine. After emerging from between the grooved rolls where the undulations are formed the corrugated sheet is guided to the point where it is glued to the liner. The mechanism can be applied in different ways according to the type of machine without departing from the spirit of the invention. It is independent of the method adopted for feeding the liner, gluing and supporting the members of the finished product and of the drying system employed.

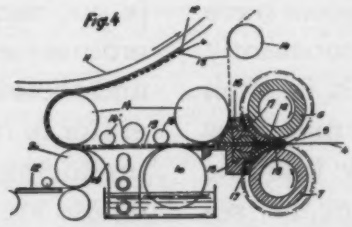
In the accompanying illustrations several arrangements are outlined for carrying out the invention on the commoner types of corrugating machines. Figures 1 and 2 are cross-section views of the corrugated board produced by the



mechanism. Figure 3 is a schematic arrangement of a corrugating machine of current construction. Figure 4 shows the mechanism applied to this machine. Figure 5 is a schematic arrangement of another type of machine. Figure 6 shows the application of the invention to this type. Figure 7 is a variant of the arrangement shown in Figure 6. In all of these figures the same numbers are used to designate the same parts.

The constricted corrugations shown in Figures 1 and 2 cannot be produced by any of the present types of machines. The space between the sides (1) of the corrugations is narrower than the bends (2). Evidently the crests of the grooved rolls could not extricate themselves from such undulations. In Figure 1 the constriction of the corrugation is moderate; in Figure 2 it is carried so far as to bring actual contact between the undulations. This gives rigidity to the carton. In these figures a carton is shown with two liners. In the following figures only one liner is shown since the addition of the other liner is accomplished by means well known and without any modification.

In the schematic representation of Figure 3 the paper to be corrugated (4) enters at (5) between the two grooved rolls (6, 7), emerges at (8) then passes between a guide roll (9) and a glue roll (10) thence around a drying roll (11) upon which is the liner (12). The liner and the corrugated paper are kept in con-

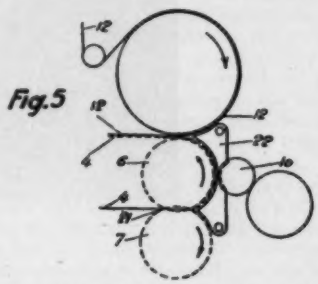


tact with the surface of the drying cylinder by an endless belt of metallic cloth (13) passing around roll (14).

In Figure 4, the same principal parts, the grooved rolls (6, 7) are shown but these are speeded up in relation to the drying cylinders (11) by an amount depending on the desired constriction of the corrugations. The feeding arrangement is not shown since it does not involve any modification. It can be seen that upon leaving the grooved rolls the corrugated paper (4) (shown as a broken line) is led through a chamber formed by a table (15) and counter table (16) each of which bears a guard (17) ending in a slice (18) which meets the grooves of the corrugating rolls. Thus the undulations of the paper leaving the corrugating rolls (6, 7) are compressed together by reason of these rolls running at slightly greater speed than the liner feed and also are kept in a guide chamber of suitable height up to the point of contact with the endless belt (13).

Glue is applied to the corrugated paper (4) by the roll (10) and the undulations are kept in constricted form by the guides (19) between the roll (10) and roll (20) where it contacts the liner (12). Above the guide (19) are rolls 14 feet which keep the undulations pressed together up to the point of contact with the liner (12). This contact is maintained throughout the drying on the hot cylinder (11).

It is apparent that if it is desired to form a corrugated sheet having the pro-



file shown in Figure 2, i. e., with sides touching one another, these can be glued together by increasing the amount of glue applied by roll (10). Upon making contact with the liner the excess of glue penetrates between the undulations binding them together.

In the machine shown schematically in Figure 5 the corrugating paper (4) enters at (21) between the grooved rolls (6, 7) and is kept in contact with the serrations of roll (6) by guide (22) through 180 deg. In the middle of this course it receives the glue applied to the crests of the undulations by glue roll (10.) When the paper reaches the upper part of the guide it meets the liner (12) heated by a hot roll (11) of small diameter and strongly pressed against the grooved roll (6.) In Figure 6 the paper (4) after being glued by roll (10) is kept on the grooved roll by guide (22) and disengaged from it by the lower

guide (18) attached to table (15) which forms with the guide (22) the chamber in which the corrugations are compressed together. On leaving this chamber the corrugated sheet contacts the liner (12) passing under a pressure roll (23) before meeting the endless belt (13) which passes around (14) and then on to the hot roll (11).

In the example illustrated in Figure 7 the same parts are shown with the difference that the corrugated sheet at

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the moment it is disengaged from the grooves of roll (6) by the guide (18) is squeezed against the guide by the flexible plate (24) above which the liner (12) is introduced. These then pass beneath a pressure mechanism consisting of a fixed part (25) supporting the plate (24.) The pressure exerted upon the corrugated sheet is regulated by the adjustable spring (27) by means of eccentric (28) and lever (29). The pressure plate (26) has a lip (30) which prevents actual contact with the table (15)

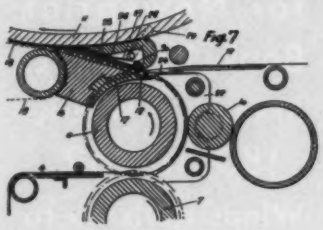
Fig. 7

in the absence of any paper, thus leaving free space for threading in the sheet. This method of application has the advantage of not requiring very precise setting to regulate the heights of the corrugations.

It is evident that these arrangements can be varied in many other ways and can be adapted to machines in which the drying is done on a flat table without departing from the spirit of the invention.

French patent No. 624,788 to Albert-Marcel Arbin through Le Moniteur de la Papeterie Francaise Apr. 1, 1936, p. 155.

◆ Recent Advances in Bleaching

The most noteworthy advance in the technique of the practice of bleaching of wood pulp in recent years has been the widespread adoption of methods for determining the bleach requirement of the pulp. Quick methods for this determination with corresponding tables to indicate the quantity of bleach liquor required have led to more economical operation as well as the production of better and more uniform bleached pulp.

The following noteworthy contributions to the literature on bleaching deserve mention:

(1) The standard methods of the Committee on Fibre Analysis, available in leaflet form.

(2) Noll's proposed scale of pulp hardness based on lignin content and chlorine demand, useful for both sulphite and alkaline process pulps.

(3) Possanner and Kraus' complete bibliography with exhaustive discussion of the various methods described.

(4) Berndt's similar discussion of several different processes.

(5) Schwalbe's discussion of the influence of pulp manipulation during bleaching.

(6) The report of the Swedish committee on standardization of mill control methods which adopted the Roe-Johansson chlorine gas method and a permanganate method employing a varying amount of the permanganate and a constant excess. (Note: References for each of the above are included in the original article.)

The most reliable method for determining bleach requirement, especially when comparing pulps of different origin, is still that of sample bleaching in glass. This requires careful temperature control. For quick results the temperature can be elevated since it is possible to convert the results obtained into the actual bleach requirement for the temperature of the mill bleaching.

Hypochlorite bleach liquors are of two classes, lime base liquors and soda base liquors. The former can be prepared either by dissolving chloride of lime in water or by absorbing chlorine in milk-of-lime. The sodium hypochlorite can be produced by direct electrolysis of common salt or by absorption of chlorine in caustic soda. Chloride of lime has completely vanished from use in preparing bleach liquors since liquid chlorine is more economical. Usually the bleach liquor is prepared by absorbing the chlorine in a milk-of-lime maintained in rapid circulation by means of a pump. The old ring-packed absorption tower is now little used owing to difficulty in keeping the towers gas tight. Liquid chlorine manufacturers are prepared to furnish designs for bleach-making equipment.

In preparing the bleach liquor it is important to remember that the temperature must not be allowed to rise too high and the milk-of-lime must not be "over-chlorinated," i. e., to complete exhaustion of the lime and consequent acid reaction. These conditions favor chlorate formation with a characteristic rose coloration. In a few hours all the hypochlorite will be converted to the useless chlorate. A bleach liquor prepared at 35 deg. to 40 deg. C. will contain from 1.4 per cent to 2.5 per cent of chlorate. And since two equivalents of chlorine are required for the formation of one of chlorate the chlorine loss is from 2.4 per cent to 5.0 per cent, which is considerable. Therefore lower temperatures are desirable; certainly not higher than 35 deg. C. (95 deg. F.), below which only traces of chlorate are formed.

There is some disagreement as to the optimum strength of bleach liquor. Some advocate as much as 50 g. per l. active chlorine, diluting before use to 35 g. per l. Others prefer as low as 15 or 16 g. per l. active chlorine and from 0.4 to 0.8 g. per l. of quick lime in order to maintain stability. The author considers liquor with more than 35 to 40 g. per l. of active chlorine of doubtful value because with increasing chlorine concentration there is a corresponding decrease in alkalinity. Diluting a concentrated liquor is not to be recommended since

◆ Measuring Whiteness of Viscose Pulps

The whiteness of sulphite pulps can be affected unfavorably by: incomplete lignin removal, absorption of colored humic substances, washing with impure water, and overdrying the pulp sheet. According to S. A. Fortieff and A. O. Hiller the relationship between whiteness and absorptivity is important. Upon bleaching the absorptivity may be decreased as much as two- or three-fold. According to the publication by A. A. Metzler and A. M. Kajartz ("Bum. Prom." 1934 No. 12) the whiteness measurement is made readily with the Pulfrich stage-photometer with opalescent attachment and the stage-lamp. The Ostwald half-shadow photometer is not satisfactory since its use is fatiguing and the readings are subject to error caused by eye-strain.

Variations in moisture content from 5 per cent to 16 per cent are practically without influence on whiteness. Increase in moisture content from 16 per cent to 45 per cent produces an appreciable drop in whiteness as shown by the following table:

Whiteness diminishes under the influence of light in a period of 40 to 45 days by about 5 per cent to 9 per cent. Comparative measurements of pulps from various sources show that the pulps from Russian mills are far inferior to those from foreign producers. In one case the variation in whiteness ranged from 80.0 to 61.0. Waldhof pulp showed the best whiteness figure, 86.0. Walsum pulp came next with 85.3.

"Zellstoff u. Papier" 15, 435-436 (1935) through Der Papierfabrikant, Apr. 5, 1936, p. 66.

Cook No.	Per cent moisture	Whiteness with Pulfrich's photometer	Per cent moisture	Whiteness with Pulfrich's photometer	Per cent moisture	Whiteness with Pulfrich's photometer
1155	air dry	56.8	15.58	58.3	39.9	62.0
1155	air dry	60.0	16.0	63.0	36.0	67.5
1255 p-2	6.1	62.6	12.2	63.3	45.0	47.0
723 p-2	5.9	59.3	10.66	58.3	43.9	44.3
1302 p-H	5.65	63.3	12.0	58.6	50.0	43.0
1290 p-1	10.0	59.0	21.6	56.0	42.0	46.3
1292 p-2	8.28	62.0	11.42	62.0	44.0	44.3
1285 p-5	air dry	62.0	16.6	69.6	39.8	48.5

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this diminishes the alkalinity which is required to maintain stability. This can be accomplished, however, by adding caustic soda to increase the alkalinity.

The decomposition of hypochlorite liquors is catalytically accelerated by heavy metals. Cobalt exerts the strongest influence. This is followed by nickel and copper while zinc has only feeble influence. In one mill with an iron bleach liquor pipe line 200 meters long strong decomposition occurred in this pipe until the inner surace limed up preventing further action.

Sodium hypochlorite liquors are more expensive than lime bleach liquors owing to the higher cost of the sodium. They are prepared by conducting chlorine into soda lye whereby any desired alkalinity can be attained. Also by electrolysis of common salt in a cell without a diaphragm. This yields a neutral liquor since the caustic soda is decomposed. Soda bleach liquors exert a beneficial action upon the pulp since the fibre encrustants are dissolved better. They also show better chlorine economy than lime bleach liquors and produce a stronger, whiter pulp of lower ash content. These advantages do not, however, compensate for the greater costs since the use of soda bleach liquors on a large scale is virtually unknown. In one large pulp mill which produces its own current by waterpower it was eventually found more economical to purchase liquid chlorine and prepare lime bleach liquor than to prepare soda bleach liquor by electrolysis.

Hypochlorite bleaching is predominantly an oxidation process though direct chlorination also plays an important part. The latter increases with acidity and aids in removal of fibre encrustants especially with hard pulps. Chlorine consumption is rapid at the start, but slows down toward the end. In multistage bleaching the first stage is the most rapid. Heat may be employed to speed up the reaction only after the major portion of the bleaching has been accomplished. In addition to the chlorination-oxidation reactions there is evidently a neutralization also since the alkalinity falls constantly throughout the bleaching period and may even go acid toward the end. This should be avoided, however, since discoloration and weakening of the pulp may result. According to Schwalbe and Wenzl the neutralization is caused by splitting off of carbonic acid. It is interesting to note that in bleaching kraft pulps 70 per cent more carbon dioxide is evolved than with sulphites. Herbert Rauchberg, "Der Papierfabrikant Apr. 5, 1936, p. 109. (To be continued).

◆ Bleaching Pulp for Rayon

It is shown that pulp of high value can be made using elementary chlorine. This was applied in a 3,000 kg. Bellmer bleacher. The consumption of elementary chlorine amounted to 9.6 kg. per 100 kg. of pulp. The total bleaching time was 7¼ hours. The pulp was acidified with 0.5 kg. sulphuric acid, washed and heated to 35 deg. The analytical values for the finished pulp were: alpha-cellulose 91 per cent, copper number 1.8, resin-fat 3.5 per cent, wood gums 2.8 per cent, ash 0.16 per cent, viscosity 20 (Ost.).

E. Friedrich. "Wochenblatt fur Papierfabrikation" 66, 496 (1935) through "Der Papierfabrikant" Apr. 5, 1936, p. 69.

◆ Rapid Bleaching at High Concentration

Preliminary investigations showed that rapid bleaching requires fairly high temperature and concentration of bleach. Also that only the utmost possible removal of bleach residues and the most rapid carrying out of the bleaching reaction can lead to best yields of highest quality of bleached pulp. This scientific knowledge was then applied in large scale experiments. These included hollander bleaching, heavy-stuff bleaching (tower-bleaching), centrifugal bleaching and bleaching of pulp sheets. By the latter method the highest possible concentration of fiber and of bleach can be obtained.

In hollander bleaching the vast size of the tub precludes a higher stuff concentration than 6 per cent to 8 per cent. On this account the tendency is toward multi-stage bleaching and the separation of the washing operation from the actual bleaching. This subdivision led to increase in stuff concentration (12 per cent to 20 per cent stock density). The tower-shaped equipment employed for this purpose gave to this system the name "tower bleaching." This introduced so many practical difficulties that it was abandoned and bleaching in the centrifuge (called "sling bleaching") was undertaken. This showed special advantages, viz.: extraordinarily short working time, high purity of pulp, high alpha-cellulose content, good whiteness, high yield, and less tendency to yellowing.

The defects of the hollander and tower bleacher can also be overcome by bleaching pulp sheets. By saturating with cold water, pressing, placing in calcium hypochlorite solution and again pressing, then warming in a steam chest or warming oven it was found that an impregnation time of 1½ minutes and a steaming time of ½ to 1½ minutes sufficed for thorough penetration of the bleach. Bleaching machines were especially built for mill-scale operation. At first these had impregnating mechanism with enclosed bucket wheel. Later impregnating, steaming and washing operations were combined in one machine. This gave the desired result, viz.: least possible mechanical action upon the pulp.

In concluding their paper the authors summarize the experimental results upon which are based German patents No. 405,004 and 420,684 as well as a number of other domestic and foreign patents.

"Results of Scientific Studies in Pulp Bleaching in the years 1921-1923" by Carl G. Schwalbe and Hermann Wenzl, Angewandte Chemie 48, 557 (1935) through Die Zellstoff-Faser February 1936, p. 26.

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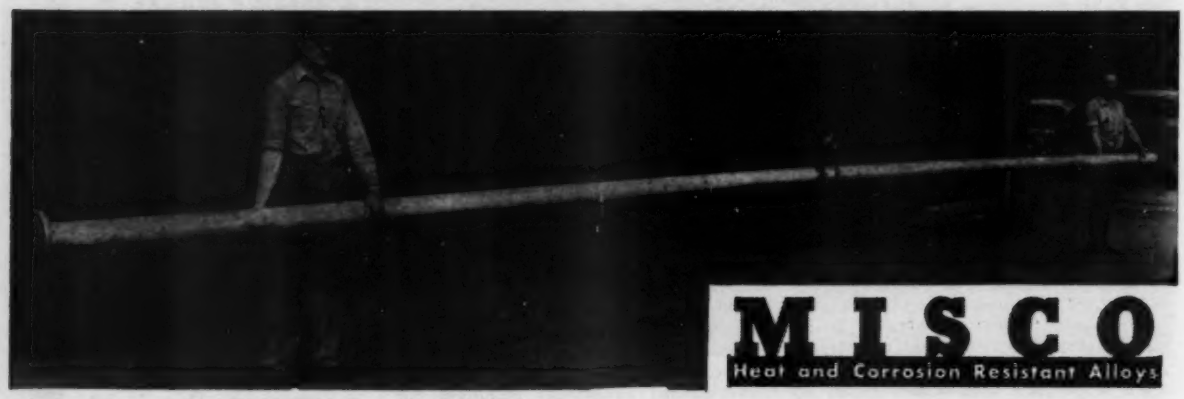

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PAPERMAKING PATENTS

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Inquiries with reference to any of these patents should be addressed to James Atkins, Munsey Building, Washington, D. C.

Compiled by James Atkins, Registered Patent Attorney

2,028,492—Core Adapter. Edwin W. Bobie, Hawthorne, N. J., assignor to International Paper Company, New York, N. Y., a corporation of New York. Application July 25, 1934, Serial No. 736,875. 6 Claims. (CL. 242—68). A core adapter comprising a cup-shaped member provided with means for engagement with a capped core whereby said adapter is prevented from moving longitudinally and rotatively relative to a core to which it has been applied, the bottom wall of said adapter being provided with a polygonal opening.

2,028,952—Apparatus for and Method of Making Paper. Philip J. Reimer, Neenah, Wis. Application February 14, 1934, Serial No. 711,089. 12 Claims. (Cl. 92—40). A forming box attachment for Fourdrinier type paper machines comprising in combination, a box having a bottom, ends and side walls, a plurality of partitions in said box defining watertight chambers, a perforated pipe communicating with the interior of each chamber, means for flowing liquids through said pipe, and drain openings in the bottom of each chamber.

The process of forming sheet material having improved characteristics, which comprises flowing an aqueous suspension of stock onto the forming wire of a Fourdrinier type paper machine, flowing liquid upwardly through the forming wire to maintain the stock thereon in suspension and gradually regulating the drainage of water through the wire to prevent the formation of two-sided sheets.

2,029,034—Pressed Fiber Board and Method of Manufacture. Robert T. Pollock, New York, N. Y., assignor to Respats, Inc., Cranston, R. I., a corporation of Rhode Island. Application July 31, 1933, Serial No. 682,970. 4 Claims. (Cl. 92—3). The process of producing hard pressed board, which comprises reducing uncooked wood and vegetable matter to fibrous states, mixing and sheeting the uncooked wood and the vegetable fibers with an excess of wood fibers over the vegetable fibers, drying and pressing to hard board.

2,029,125—Wood Grinding Machine. Andrew N. Russell and John D. Robb, Lachine, Quebec, Canada, National Trust Company Limited, executor of said John D. Robb, deceased, assignors to Dominion Engineering Works Limited, Lachine, Quebec, Canada. Application May 18, 1932, Serial No. 612,125. In Great Britain August 11, 1931. 8 Claims. (Cl. 83—75). A pulp wood grinder comprising a magazine, a plurality of reciprocable feed members arranged therein, a piston connected to each feed member, a separate cylinder for each of said pistons, high and low pressure fluid supply lines, a valve mechanism for each cylinder operable to periodically connect one end of said cylinder with the high pressure fluid supply line to effect a working stroke of the feed member and to periodically connect the remaining end of the cylinder with the low pressure fluid supply line to effect a return stroke of the feed member, said valve mechanism also serving to connect each end of the cylinder with an exhaust line during admission of fluid to the opposite end of the cylinder, a differential piston connected to operate said mechanism to positions alternately connecting each end of the cylinder with its respective fluid supply line, a differential cylinder containing said differential piston, one end of said differential cylinder being in constant communication with a pressure line, and means functioning periodically to alternately connect the remaining end of the differential cylinder with a pressure line and with an exhaust line.

2,029,273—Process of Coating Paper. William J. Montgomery and Donald B. Bradner, Hamilton, Ohio, assignors to The Champion Paper and Fibre Company, Hamilton, Ohio, a corporation of Ohio. Application January 25, 1929, Serial No. 335,016. 30 Claims. (Cl. 101—426). In the manufacture of paper which is at least partially covered with coating having a cast surface, the hereindescribed process which comprises depositing a fluid aqueous coating upon a hard nonadhering finishing surface, cementing paper to said coating, separating the paper together with the coating from said finishing surface, and hardening the coating to a non-plastic cast condition on said finishing surface prior to the separation thereof.

2,029,390—Waterproofed Plastic Paper and Method of Producing the Same. Earle V. Rodgers, Kenilworth, N. J. Application June 8, 1933, Serial No. 674,822. 4 Claims. (Cl. 91—68). The method of producing a waterproofed plastic product, which comprises treating creped paper with a non-aqueous solution containing a pigment and a stearate and an organic solvent.

2,029,525—Transparent Tissue and Process of Making Same. Carleton Ellis, Montclair, N. J., assignor to Ellis-Foster Company, a corporation of New Jersey. Application November 14, 1929, Serial No. 407,292. Renewed May 31, 1934. 4 Claims. (Cl. 91—68). Paper carrying a transparency augmenting resin including a urea aldehyde resin and a plasticizing synthetic resin including an acetone formaldehyde resin.

Glassine paper carrying a urea aldehyde resin.

2,029,616—Process for Preparing Alkali Sulphite or Alkali Bisulphite Solutions from Waste Liquors Obtained in the Digestion of Cellulose with Alkali Sulphur Compounds. Gustaf Haglund, Stockholm, Sweden, assignor to Patentaktiebolaget Gröndal-Ramen, Stockholm, Sweden. Application April 10, 1931, Serial No. 529,300. In Germany January 16, 1931. 11 Claims. (Cl. 23—129). The process for preparing a solution of alkali metal salts of sulphurous acid from waste liquor resulting from a cellulose digestion process employing cooking liquor containing alkali metal sulphur compounds, which comprises treating the waste liquor to eliminate organic compounds and to form a solution of alkali metal compounds containing an alkali metal sulphate and substantially free from sulphides and thiosulphates, subjecting the solution to the action of sulphur dioxide and one or more calcium compounds capable of reacting with sulphurous acid to form calcium bisulphite until the alkali metal salts contained in the solution have been converted to bisulphites, and subjecting the resulting solution to the action of one or more alkali metal compounds capable of reacting with calcium bisulphite to form one or more insoluble calcium compounds.

2,030,267—Fertilized Mulch Paper. Edward Roy Pratt, West Medford, Mass. Application January 7, 1935, Serial No. 718. 7 Claims. (Cl. 47—9). An improved fertilized mulch paper comprising in combination, a paper ribbon coated on one side with a prepared fertilizer, partially pierced disc members located at intervals along said ribbon.

2,029,973—Paper Pulp Making Process. Sidney D. Wells, Combined Locks, Wis., assignor of one-half to Gerald D. Muggleton, Appleton, Wis. Application August 22, 1934, Serial No. 741,010. 9 Claims. (Cl. 92—6). The hereindescribed method of producing paper pulp which consists in feeding a continuous stream of the material into a rod mill, immersing the material in partially spent, hot, cooking lyes from a subsequent digestion step, separation of the fibrous and cellular elements by the beating, pounding and rubbing action of the freely falling rods within the rotating drum of the mill, discharging the pulp material from the mill continuous-

ly, removal of the substantially completely spent lyes therefrom, treatment of the material to digestion at elevated temperature with cooking lyes containing an excess of cooking chemical and removal of the partially spent lyes from the completely pulped material for use in the preliminary treatment of the raw fibrous material in the rod mill.

2,030,382—Method of Treating Pulp. Arno J. Luth, Port Edwards, Richard A. Nugent, Nekoosa, and Neil H. Christian, Port Edwards, Wis., assignors to Nekoosa-Edwards Paper Company, Fort Edwards, Wis., a corporation of Wisconsin. Application October 18, 1934. Serial No. 748,921. 11 Claims. (Cl. 8—2). The method of obtaining bleached pulp of improved characteristics from pulp prepared by the use of an alkaline cooking liquor containing an active sulfide ingredient, which comprises treating the pulp in a closed vessel under pressure before being exposed to the oxidizing influences of dissolved and atmospheric oxygen with a fresh caustic alkali solution in an amount equivalent to about 2.5 to 15% of NaOH on the air dry weight of the pulp to dissolve phlobotannin color bodies, subjecting the treated pulp after washing to a multi-stage bleaching operation and treating said pulp intermediate successive bleaching steps with an alkaline solution to remove color bodies then present.

2,030,383—Method of Treating Pulp. Arno J. Luth, Port Edwards, Richard A. Nugent, Nekoosa, and Neil H. Christian, Port Edwards, Wis., assignors to Nekoosa-Edwards Paper Company, Port Edwards, Wis., a corporation of Wisconsin. Application October 18, 1934, Serial No. 748,922. 7 Claims. (Cl. 92—14). The method of treating pulp which has been cooked with a cooking liquor containing a sulphur compound as an active ingredient thereof, which comprises subjecting the freshly cooked pulp before washing in a closed vessel to the action of a caustic solution of sufficient strength to dissolve color bodies present and then washing the pulp.

2,030,384—Method of Bleaching Pulp. Arno J. Luth, Port Edwards, Richard A. Nugent, Nekoosa, and Neil H. Christian, Port Edwards, Wis., assignors to Nekoosa-Edwards Paper Company, Port Edwards, Wis., a corporation of Wisconsin. Application October 18, 1934, Serial No. 748,923. 7 Claims. (Cl. 8—2). The method of obtaining bleached pulp of improved characteristics from pulp prepared by the use of an alkaline cooking liquor containing an active sulphide ingredient, which comprises treating the pulp before it is washed and before it is exposed to the oxidizing influences of dissolved and atmospheric oxygen with a caustic alkali solution containing an oxygen liberating alkali metal compound, subjecting the treated pulp after washing to a multi-stage bleaching operation and treating said pulp between successive bleaching steps with a caustic alkali solution also containing an oxygen liberating alkali metal compound.

In the process of obtaining a bleached sulphate pulp of improved characteristics, the step of subjecting freshly blown pulp before it is exposed to the oxidizing influences of dissolved and atmospheric oxygen to the action of an aqueous solution of caustic soda and sodium peroxide, the amount of caustic soda being equivalent to 2.5 to 15% of NaOH on the air dry weight of the pulp and the amount of sodium peroxide being equivalent to 0.5% and higher on the air dry weight of the pulp.

2,030,469—Manufacture of Parchment Papers. George A. Richter, Berlin, N. H., assignor to Brown Company, Berlin, N. H., a corporation of Maine. Application September 2, 1932, Serial No. 631,495. 2 Claims. (Cl. 8—20). A process for producing a parchment paper presenting a variegated ornamental appearance which comprises first distributing through a paper base over localized areas only thereof a compound which reacts with parchmentizing, sulphuric acid solution to produce an insoluble, opaque filler in situ in the base, and thereafter treating the paper with said solution to effect its parchmentization and to produce said filler.

2,030,625—Apparatus for and Process of Making Synthetic Products. George H. Ellis, St. Paul, Minn., assignor to The Insulite Company, Minneapolis, Minn., a corporation of Minnesota. Application January 13, 1934, Serial No. 706,555. 22 Claims. (Cl. 92—21). A process for producing hard, insecticide proof, synthetic bodies which comprises forming a continuous sheet from fibrous pulp stock having commingled therewith a toxic agent, squeezing the sheet to remove the surplus water, drying the sheet to remove substantially all the moisture, compacting the sheet under heat and pressure by means of rotatable members, tempering the sheet, severing the sheet transversely, passing the severed portions through a humidifier and finally passing the severed portions through a cooling means.

2,030,626—Fibrous Product and Method of Making the Same. George H. Ellis, St. Paul, Minn., assignor to The Insulite Company, Minneapolis, Minn., a corporation of Minnesota. Application April 27, 1934, Serial No. 722,780. 21 Claims. (Cl. 92—39). The method of making fibrous products from waste fibrous material which comprises mechanically breaking up the fibrous material, reducing it to a pulpy mass, manipulating the mass to form a sheet from a water bath, removing the surplus moisture from the sheet and subjecting the sheet to the application of heat and pressure, said heat decreasing as the moisture contents of the sheet decreases.

2,030,653—Fireproofing. Robert G. Quinn, Glens Falls, N. Y., assignor to International Paper Company, New York, N. Y., a corporation of New York. Application December 18, 1931, Serial No. 581,825. 20 Claims. (Cl. 92—21). A continuous process for making fibre board, comprising the steps of preparing a stock solution of commercial monoammonium phosphate and boric acid of predetermined quantity and concentration, and containing finely divided colloidal material, adding a portion of said solution to coarse fibre stock, simultaneously subjecting other fibrous stock to a refining operation in the presence of another portion of said solution to form fine fibrous stock, separately screening the said coarse and said fine stock, commingling the stocks with an emulsion of size, wax and chlorinated naphthalene or the like, subjecting the mixture to beating action, forming the mixture into boards, recovering the solution expressed during the forming step, adding the recovered solution to the stock solution, drying the board, moistening the surfaces of the board with ammonia solution, and replenishing the stock solution with the amount removed from the system by the board, thereby maintaining a substantially constant amount of solution in contact with the fibre stock.

A process of making fibre board which comprises mixing ammonium phosphate, boric acid and a non-inflammable waterproofing composition with fibres in fluid suspension, forming such fibre into board, drying and treating the surfaces of the board with a solution of ammonia.

2,030,483—Method for the Manufacture of Coated Paper. Diong D. Uong, Fitchburg, Mass., assignor to Fitchburg Paper Company, Fitchburg, Mass., a corporation of Massachusetts. Application April 1, 1933, Serial No. 663,966. 1 Claim. (Cl. 92—40). The method of coating paper which comprises removing a portion only of the moisture from a paper web in a paper machine having forming wires and a pressing section, applying a coating of moisture-reactive coating material in dry powdered form to the paper web after said web has left the forming wires and at a point adjacent the pressing section, allowing said powdered coating material to coact with the still substantially moist paper web, and thereafter drying and removing additional moisture from said web and causing said previously powdered material to form a relatively smooth surface on the paper prior to leaving said machine, all of said operations being performed successively as parts of a continuous paper-making process.

2,031,854—Surface-Finished Paper. George A. Richter, Berlin, N. H., assignor to Brown Company, Berlin, N. H., a corporation of Maine. Application September 11, 1931. Serial No. 562,430. 1 Claim. (Cl. 91—68.) A paper whose fibrous body portion is sized and made water-resistant by the dissemination therein of about 2½ per cent to 5 per cent, based on the weight of dry fiber, of a water-resistant sizing agent, and at least one face of which is surfaced with a pellicle of regenerated cellulose receptive of and penetrable by printing and writing inks, said pellicle being developed in situ from a smooth, thing film of solution deposited on said paper base and being so intimately bonded with the main body of the paper as to constitute therewith in effect a single ply of integral structure.

The COMMERCIAL OUTLOOK

New York, May 1, 1936.

WHILE there has been something of a slowing down process in some branches of the paper manufacturing industry, on the whole paper and board mills are busily engaged and are enjoying market conditions which give rise to considerable favorable comment. It is true that demand for certain lines of paper and board has simmered off to an extent in the past few weeks, but this is the exception rather than the rule and regarded as mainly seasonal, and there is no question but that paper production is on a large scale, and, in the aggregate, gradually reaching a higher level.

Nearly all basic indicators point to a very encouraging general business situation. Steel manufacturing is at the highest level in seven years, automobile production and sales are bordering onto new high records, retail movement of merchandise is steadily attaining greater volume, and most of the important manufacturing industries are consistently improving their position by gradually stepping up their output for which they are finding an outlet in the domestic or foreign markets. The one hampering factor seems to be that this is a presidential election year, and there is a certain degree of caution being exercised by buyers in practically all lines because of the uncertainty on the political horizon. True enough, securities have suffered a fairly sharp decline on the stock exchanges lately, yet this is regarded in most quarters as a healthy reaction following a lengthy period of almost constant upward trend in stock and bond values. The only puzzling feature is that the stock market should turn easy in the face of an exceedingly active and bullish industrial condition.

Gathering greater force from the strength developed during the last half of 1935, the trend of both production and distribution in the paper industry during the first quarter of the current year was definitely upward, states a survey of the paper industry recently completed by a nationally known credit and statistical organization. The survey goes on to say that "in spite of the severe weather conditions in February and the floods in March, which damaged many mills, all branches of the paper manufacturing industry were reported to be in a position to make a constantly better showing during the ensuing months of 1936 with respect to volume as well as earnings. The outlook for improvement in the latter has been brightened by prospects of price increases.

"Even though the present schedules of mills at 10 to 20 per cent above last year's may not be maintained during the balance of this year, production doubtless will run ahead of that of 1935, which trade estimates placed at 10,375,000 tons of paper and paperboard. This represented a gain of 13.5 per cent over the 1934 output of 9,140,000 tons, as compiled by the Bureau of the Census.

"Since July, 1935, paper mills have operated each month through March, 1936, at a higher level than in the corresponding one of the year preceding, with the outstanding increase in those producing newsprint, kraft, and paper for the building trade. Employment in the industry was up nearly 5 per cent in 1935 over that of 1934, while payrolls from the first of 1934 to the end of 1935 advanced around 27 per cent. Schedules at most plants during the first quarter of 1936 were the highest recorded for the comparative period back to 1930. For the first three months of the current year, wholesale distribution of paper was 10 to 15 per cent larger than in the comparative 1935 period, despite the recession in February. This followed a gain of 8 to 10 per cent in 1935."

The various groups of paper manufacturers are striving diligently to effect a modest advance in prices of their product. During the past couple of years production has consistently increased along with a proportionate growth in sales, yet prices have recorded scant improvement, in some instances having moved downward in more recent months. Manufacturing costs have mounted, and manufacturers have come to a full realization that only through the medium of price increases can they operate their factories at a fair rate of profit. There are favorable indications that reasonable market advances will be made in the near future, which if they materialize will put the industry in a far healthier position.

With United States newsprint mills showing the second successive monthly increase in output, after a long series of declines, Canadian mills continued to produce record tonnages in March, and output for mills in both countries for the first three months of the year topped that for any similar period with the exception of 1928, 1929 and 1930, according to figures reported by the News Print Service Bureau.

Canadian newsprint production during March was 243,900 tons, compared with 205,682 tons in March last year, an increase of 38,218 tons, or 18.6 per cent. The previous record March for Canadian mills was in 1929, when 218,147 tons were manufactured. This production brought the Canadian mills output for the first quarter to 693,424 tons, against 587,946 tons last year, an increase of 105,478 tons, or 17.9 per cent. The previous peak for Canadian production for the first three months of the year was in 1929, when 618,893 tons were turned out.

United States mills produced 76,507 tons of newsprint in March, a gain of 2,979 tons, or 4.0 per cent, over the 73,528 tons in March a year ago. This brought the three months' total up to 228,120 tons, contrasted with 224,999 tons last year, a rise of 3,121 tons, or 1.4 per cent. Mills in both the U. S. and Canada manufactured 320,407 tons of newsprint in March, against 279,210 tons in March, 1935, an increase of 41,197 tons, or 14.7 per cent. Output for the first quarter for both countries was 921,544 tons, compared with 812,945 tons last year in the same time, a gain of 108,599 tons, and from United States mills 74,300 tons, or 13.3 per cent. Shipments from Canadian mills in March were 239,253 tons, making combined shipments of 313,553 tons. Stocks of newsprint at mills in both countries at the end of March amounted to 114,417 tons, against 107,563 tons a month earlier, and 78,396 tons a year previously.

Paperboard production in the United States totaled 270,928 tons during January last, compared with 243,594 tons in the preceding month, and 262,026 tons in January, 1935. Mills received new orders for 283,890 tons of board in January, against 234,753 tons in the month preceding, and had unfilled orders for 94,210 tons at the end of January, contrasted with 81,894 tons at the close of December last.

◆ ◆

◆ Sales Depts. of General Regulator and Foster Wheeler Consolidated

Announcement is made by Foster Wheeler Corporation and General Regulator Corporation that a consolidation of the sales departments of the two companies has been completed.

The distribution of General Regulators will be made hereafter through the branch offices and agents of Foster Wheeler Corporation, and all communications on the subject may be addressed to them. The sales headquarters of the General Regulator Corporation will be at the general offices of Foster Wheeler Corporation, 165 Broadway, New York, N. Y.

C. J. King, who has been identified with the General Regulator Corporation since it was organized, will direct this work from New York as in the past. Due to the broader contacts thus established, it is believed that a more widespread service will be rendered customers of the General Regulator Corporation, and that a more comprehensive distribution will be established throughout the country.

F.C.HUYCK & SONS

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KENWOOD WOOL PRODUCTS REG. U.S. PAT. OFF.

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PAPER AND PULP MILL CATALOGUE

333 N. Michigan Avenue, Chicago, Illinois

Domestic RAW MATERIALS

◆ Papermaking Rags

The market for papermaking rags is much quieter than a few weeks ago. Demand has simmered off to a substantial degree, with virtually all classes of rags affected, and it would appear as if paper manufacturers in general have covered their needs sufficiently for a time to enable them to diminish their buying appreciably in comparison with their operations in the market earlier in the year. As would be expected under the circumstances, prices in most cases have moved somewhat lower, and still exhibit an easing tendency. On the other hand, it is the contention of dealers and importers that a truly strong situation prevails as concerns available supplies in this country and abroad. Dealers assert that a return to the volume of demand noted a comparatively short time back in any class of rags would result in a quick ascension of market prices, probably to higher levels than witnessed in the last buying spurt. It is said that incoming supplies of rags have dropped off following the spring collection bulge; that the market is well sold up, with stocks in packers' establishments exceptionally small, and that purchases in Europe are very difficult to accomplish at prices in line with prevailing market levels here.

Roofing rags have moved lower during the last month. There has been no great pressure to sell but greatly reduced demand from mills has caused prices to ease gradually. In the East, No. 1 domestic roofing stock is quoted at 1.90 to 2 cents a pound f. o. b. shipping points, and No. 2 at 1.70 to 1.75 cents. Approximately these same prices prevail in the Middle West. Foreign roofing is priced at around 2.35 cents a pound for linsey garments and 2.10 cents for dark colored cottons ex dock basis at New York, and importers insist they cannot afford to sell below these levels owing to the relatively high prices dealers abroad demand. Roofing paper manufacturers have let down in buying of rag stock, apparently having accumulated sizeable supplies and receiving large shipments from abroad against old orders. At the same time, roofing mills are busy and are consuming rags on a big scale.

New cuttings are quieter but have registered little price change. In some instances, scarce grades have shown further slight value appreciation, although domestic paper mills are purchasing more sparsely and exportations to Europe have diminished materially. Eastern dealers continue to ask in the vicinity of 8.50 cents a pound delivered paper mills for No. 1 new white shirt cuttings, while soft unbleached muslins are quoted at 8.50 cents f. o. b. shipping points, light silesias at 6 cents, blue overall cuttings at 6.75 to 7 cents, light flannelettes at 6 cents, fancy shirt cuttings at 3.25 to 3.50 cents, and washables at 3 cents. Sales of new white linen cuttings have been made at 11 cents a pound delivered paper mills in New England, and it is said there is a demand for additional supplies at this price level.

Old white cotton rags are quoted at 3.50 cents to perhaps slightly higher f. o. b. dealers' points for No. 1 repacked, and 3 cents for No. 2 repacked. Thirds and blues, repacked, are 2.40 to 2.60 cents at shipping points.

◆ Old Paper

The market for old paper has turned easy, particularly in the East, where prices of low grades have sunk to the cheapest levels seen in a long time. A shrinkage of demand from board mills, due evidently in part to good stocks on hand and a falling off in consumption, has led to pressure from at least some quarters to market material. No. 1 mixed paper has declined to 20 cents per hundred pounds f. o. b. shipping points in the East, and folded news to 27½ cents. Even at these prices there is not enough consuming demand to absorb all the tonnage on the market. Certain of the high grades are firm in price, notably soft white shavings which have sold at 2.30 cents a pound for one-cut quality and 1.90 cents for No. 1 ordinary packing f. o. b. shipping points, and hard white envelope cuttings which have brought 2.50 cents for No. 1 grade at points of shipment. Old books and magazines are 55 cents per hundred pounds in the East at dealers' points, old No. 1 kraft paper a cent per pound, white ledgers 1.05 to 1.10 cents a pound, colored ledgers 80 to 85 cents per hundred pounds, and old corrugated boxes 50 to 55 cents.

◆ Rope and Bagging

The market level of old rope has advanced $5 a ton, if not more. Paper manufacturers are offering 2.50 cents a pound at shipping points for No. 1 domestic old manila rope, and it is stated they are finding it difficult to buy at this basis, with the result some of the so-called independent mills are paying in excess of this price. Dealers in numerous cases are demanding 2.75 cents, and probably are securing this figure in at least some sales. Foreign old manila is quoted around 2.60 cents ex dock New York, and importers say they face difficulty covering sales at this level to paper mill customers.

Old bagging is in less call but steady quotably. There seems every justification for the belief a definite scarcity of bagging exists. Dealers and importers are cautious in booking mill orders, and generally ask at least 2 cents a pound at shipping points for No. 1 domestic scrap burlap and 2.15 cents for No. 1 gunny bagging, and higher for imported bagging.

◆ Pulpwood

The pulpwood market is steady to firm with supplies moving against contracts, and no definite instances of price revisions reported.

◆ Mechanical Pulp

The market for groundwood does not exhibit a great deal of activity on its surface, but there is reason to believe fair demand is leading to a moderate volume of business. Domestic groundwood is not figuring in many sales currently because producers haven't much of their output to sell. Most transactions in mechanical pulp at present involve Canadian or Scandinavian wood. A firm undertone is noted, and prices are well maintained. Domestic pulp is about $24 to $25 a ton f. o. b. grinding plants, depending on the haul to consuming mills, while Canadian groundwood is selling at around $27 a ton delivered paper mills, also depending on freight, and Scandinavian groundwood at $23 to $24 per short ton for dry and $22.50 to $23 for moist ex dock New York or other American Atlantic ports. Some producing mills are well sold and are making few offers of pulp, which lends support to a generally firm market situation.

◆ Chemical Pulp

Chemical wood pulp is in a strong market position. Most producing mills are so far sold ahead that they are little disposed to accept additional orders; in fact, it may be stated that a good many manufacturers are completely out of the market as sellers for delivery for some months to come. It is asserted generally that a large volume of additional sales could be made readily were the necessary pulp available. Prices are firm to strong, and show an advancing tendency. Prime bleached sulphite for any near delivery is quoted at 2.60 to 2.75 cents a pound, ex dock Atlantic seaboard basis, although it is said some domestic mills are delivering such pulp against contracts for the second quarter at 2.50 cents. Domestic bleached soda pulp is 2.60 cents a pound delivered book paper mills, unbleached sulphite 1.90 to 2.05 cents per pound ex dock Atlantic seaboard, and domestic kraft pulp of No. 1 eastern grade around 2.25 cents delivered consuming centers.

◆ Chemicals

Papermaking chemicals are moving freely and adhering steadily to price levels, few changes being noted. Sulphur is quoted at $18 a ton for bulk shipments on contracts for 1,000 tons or over, and $20 for smaller tonnages. Spot lots are usually $21 f. o. b. works. China clay is on a price range of $14 to $20 a ton ex dock for imported, and $6.50 to $12 for domestic.

"NON-USERS ARE THE LOSERS"

TENAX FELTS

FINISH AND TRIM

Performance, Cost and Schedules

Given all kinds of time for careful "makeready" and a slow schedule of operation, almost any machine in any mill can run acceptable paper. Output that stays put the first time shipped. BUT, the real test comes in busy days like these. When production schedules are speeded up, with quality requirements equally exacting. THAT'S WHEN experienced papermakers clothe their machines with TENAX FELTS for low costs on long runs, for better finish with pronounced savings in finishing costs.

"Non-Users Are the Losers"

LOCKPORT FELT COMPANY

NEWFANE, NEW YORK, U. S. A.

16 per cent Improvement

The one hundred and ten mills which competed in the Paper and Pulp Section Safety Contest for the year July 1, 1934 to June 30, 1935 showed a 16 per cent improvement over last year. These mills employed 42,378 men who worked 86,867,184 man-hours. The average frequency rate was 16.566, a marked decrease from the average frequency of 19.626 last year.

▽ If you are not familiar with the accident prevention service that may be secured from the National Safety Council it will pay you to investigate. Complete information gladly furnished on request by the

National Safety Council

[INCORPORATED NOT FOR PROFIT BUT TO PREVENT ACCIDENTS]

20 North Wacker Drive ∴ ∴ Chicago

The following mills had the best records in their respective groups:

DIVISION I

Group A

Hollingsworth & Whitney Co., Algonquin & Taconnet Mill, Waterville, Maine, 2,449,530 hours, 11 injuries.

Bryant Paper Co., Kalamazoo, Mich., 1,491,538 hours, 9 injuries.

Canadian International Paper Co., Three Rivers, Quebec, 1,970,445 hours, 13 injuries.

Group B

St. Croix Paper Co., Woodland, Maine, 785,793 hours, no injuries.

Kimberly-Clark Corp., Niagara, Wis., 950,126 hours, 6 injuries.

Fraser Co., Ltd., Edmundston, N. B., Canada, 997,740 hours, 8 injuries.

Group C

International Paper Co., N. Tonawanda, N. Y., 548,504 hours, 1 injury.

The Crystal Tissue Co., Middletown, Ohio, 478,597 hours, 1 injury.

Escanaba Paper Co., Escanaba, Mich., 612,374 hours, 2 injuries.

Group D

Bird & Son, Inc., Phillipsdale, R. I., 216,581 hours, no injuries.

United States Envelope Co., Morgan Paper Co. Div., Lititz, Pa., 184,863 hours, no injuries.

International Paper Co., Livermore Mill, Chisholm, Maine, 158,610 hours, no injuries.

Spaulding Fibre Co., Inc., New Mill Plant, Milton, N. H., 125,879 hours, no injuries.

International Paper Co., Riley Mill, Riley, Maine, 116,298 hours, no injuries.

DIVISION II

Container Corporation of America, Natick, Mass., 166,846 hours, no injuries.

Texas Corrugated Box Co., Dallas, Texas, 141,340 hours, no injuries.

Southern Container Company, Houston, Texas, 129,016 hours, no injuries.

United States Gypsum Co., Genoa, Ohio, 82,084 hours, no injuries.

Import and Export MARKETS

IMPORTS

◆ Wood Pulp

The outstanding feature in the imported wood pulp situation is the sold out position of a large majority of pulp mills in Scandinavia and elsewhere abroad. It is an absolute fact that many producers have no more pulp to sell for the balance of this year; it is probable, of course, that they haven't sold the last ton of their product for 1936, literally speaking, but they are so well committed that they do not care to accept additional orders at this time, more especially from what might be termed outside customers. Perhaps they are conserving such limited tonnage as they may yet have to dispose of this year against possible requirements of regular clients; it is also possible that some are refusing to book further orders while desiring to retain at least a small amount of pulp for sale later in the year when they may secure slightly higher prices.

At any rate, New York pulp importers and agents assert that recently they have been obliged to turn down a greater volume of offered business than they have been enabled to accept, and it stands to reason these marketers are not refusing business because of any dislike on their part to selling pulp. It can be stated, without a trace of exaggeration, that for the first time in a long while it is really hard to purchase chemical pulp, particularly bleached sulphite and kraft. Paper and board manufacturers, appreciating the supply condition in process of development and regarding prices as favorable and in all likelihood as low as they will witness for some time to come, have bought freely during the last few months, covering their needs throughout the current year in some cases well into 1937.

Prices are exceedingly firm, as would be expected under such circumstances. Bleached sulphite has stiffened in value to where 2.75 cents is regarded as the market level for imported prime pulp of this description on an ex dock basis American Atlantic seaboard. It is feasible, it is said, to get some small lots of bleached sulphite of a little less than first grade at 2.65 cents, but any strictly prime bleached for shipment from abroad during the remainder of this year is held firmly at 2.75 cents. Kraft pulp of prime Scandinavian quality is quoted at 2 and 2.10 cents a pound, American Atlantic seaboard, for shipment any time during 1936, and even secondary grades of kraft are reported bringing 1.80 cents and up to 1.90 cents. The strength in bleached sulphite and kraft has aided unbleached sulphite to an extent that prime grades of the last named are priced firmly at 1.95 to 2.05 cents at New York or other Atlantic ports. Foreign groundwood of Scandinavian origin is $23 to $24 per short ton for dry ex dock American Atlantic seaboard, and $23 or a shade less for moist. Some sales of thin-sheet dry groundwood have been made up to $24.50 per short ton.

Imports of wood pulp into the United States decreased during February compared with the several previous months; in fact, the February receipts were the smallest in any month since August last. Department of Commerce figures show that a total of 143,454 short tons of 2,000 pounds, air dry weight, of chemical pulp was imported in February, valued at $5,602,125, against 190,938 short tons of a declared value of $6,942,442 in January this year, and 96,965 tons of a value of $3,980,928 in February, 1935. In December last, chemical pulp imports amounted to 217,730 short tons; in November, 178,447 tons; in October, 204,154 tons, and in September, 148,114 tons, so that February arrivals were the lowest since the 135,112 tons imported in August last. Receipts during the first two months of this year totaled 334,392 short tons of a value of $12,544,567, contrasted with 257,068 tons of a value of $10,064,849 in the corresponding time of 1935.

Mechanical pulp imports in February were 12,318 short tons of a value of $212,024, against 18,207 tons of a value of $319,906 in the month preceding, and 11,625 tons of a value of $171,231 in February a year ago.

◆ Paper Stock

Papermaking rag imports into the United States in February last amounted to 16,172,189 pounds of a value of $227,285, and made a total of 34,975,417 pounds of a value of $467,302 in the first two months of this year, showing an appreciable increase over the 16,520,000 pounds of a declared value of $171,102 imported in the similar two months last year, according to U. S. Department of Commerce statistics. Imports of miscellaneous paper stock, comprising old rope, bagging, waste paper, etc., in February were 10,759,682 pounds of a value of $172,692, and for two months this year totaled 20,233,907 pounds of a value of $318,362, compared with 9,502,819 pounds of a value of $137,401 in the first two months a year ago.

◆ Paper

Importations of paper and paper products into the United States in February last were valued at $6,442,343, of which amount $5,441,937 represented 157,456 tons of newsprint and $1,000,406 other classes of paper and paper products. Newsprint receipts dropped 12 per cent during February compared with the preceding month but were 14 per cent higher than for February, 1935. Imports of other classes of paper decreased 10 per cent in aggregate value compared with January this year, yet were 28 per cent above those reported for the same month of 1935. Increases occurred chiefly in receipts of "other printing papers," kraft wrapping, and boards, exclusive of pulp boards in rolls.

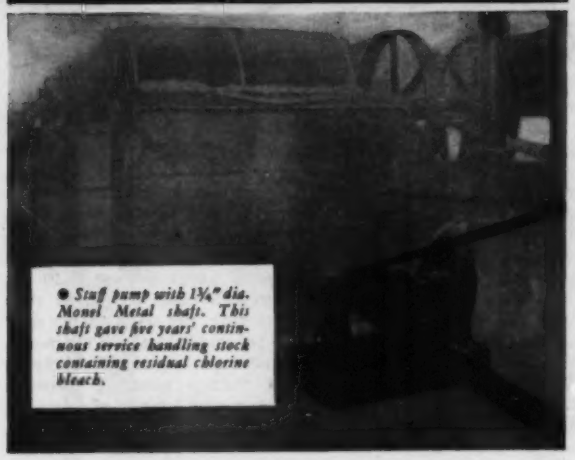
EXPORTS

Exports of paper and paper products from the United States recorded some decline in February contrasted with the preceding month. Compared with the corresponding month last year, the volume of February's shipments also decreased. The aggregate value, however, was approximately 10 per cent in excess of February, 1935. This rise in value was partly due to an increase in the prices of various classes and partly to the fact that an increase in the volume of shipments occurred chiefly in the higher priced lines, such as writings, surface-coated papers, greaseproof and waterproof wrappings, bristols, and vulcanized fiber. Exports of converted articles also showed a gain compared with February last year. Among the coarse groups, shipments of boxboards, which more than doubled in volume compared with a year ago, alone registered an increase over the same month last year. Exports of newsprint, wrapping paper, and old newspapers were greatly under the February, 1935, shipments.

Total exports in February last were valued at $1,684,930, against $1,822,198 in January this year and $1,548,207 in February last year. It is not possible to state definitely the tonnage of these exports, since insulating and wallboards and paper hangings are not reported by weight. Eliminating these three classes and also a substantial amount included under the classification "other paper and paper products" for which value only is shown, the volume of paper exports dropped from 17,993 tons in February, 1935, to 16,256 tons for the corresponding month this year. January last exports totaled 18,663 tons. The products eliminated represent about one-fifth of the total valuation.

Paper base stocks were exported in February to the value of $651,880, against $723,635 in the similar month of 1935.

MONEL METAL	OPPONENT
60	18


● Stuff pump with 1¾" dia. Monel Metal shaft. This shaft gave five years' continuous service handling stock containing residual chlorine bleach.

...That's the SCORE, in months of service, that Monel Metal rolled up against steel in this pump shaft handling Chlorine bleached stock...

HERE'S a short story . . . of a long life. Long, that is, for the shaft of any stuff pump that comes in contact with residual chlorine bleach.

The facts speak for themselves: The Monel Metal pump shaft shown here, in a well-known paper mill, is just retiring, *after 5 years' service in bleached stock.* Steel rods previously used seldom lasted longer than 18 months.

When we say it's retiring, we mean only *from this pump.* Its surface is still smooth, unpitted . . . not a sign of rust, of course. Its owners are machining it down to use in a smaller pump . . . where it is starting life over again.

Just *one* story of what Monel Metal's tough strength, rust-proofness, and corrosion resistance did in *one* installation. Other paper men tell us of Monel Metal shafts lasting ten years. Many agree that its smooth surface saves up to 80% on their costs for packing.

Hadn't you better get the facts on Monel Metal? Write today for: "Monel Metal in Pulp and Paper Mills"; "Monel Metal in Pumps"; "Mill Schedule on Monel Metal Cold-Drawn Shafting."

THE INTERNATIONAL NICKEL COMPANY, INC.
67 WALL STREET, NEW YORK, N. Y.

Monel Metal

Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

MONEL METAL

Here are three S. W. W. bed plate patterns — abrasive-steel combination plate at the top—diamond pattern in the center—S. W. W. standard elbow pattern below. We also are prepared to build plates to customers' designs and specifications. They are all in general demand which bespeaks their reputation throughout the industry.

Also an extensive line of beater bars in standard and special types. Likewise bars to meet special requirements forged out of carbon and alloy steels, stainless steel and bronze.

Paper trimming knives, chipper knives, Dayton roll bar grinders and Dayton abrasive wheels.

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One of several large Lewellen Transmissions in an Ohio paper mill. This one drives a coating machine. High quality and quantity production today requires extreme accuracy of variable speed control. That is why Lewellen is being adopted by more paper converters, textile mills, bakeries, and general industries, for conveyors and all other synchronized operations. Lewellen Transmissions and automatic controls can be depended upon for accuracy and high efficiency.

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